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AIR POLLUTION ABSTRACTS

42406 - 43104

DECEMBER 1974

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 42406 - 43104.

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VOLUME 5, NO. 12 DECEMBER 1974

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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APTIC Publications

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Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

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Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

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Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:94, $0.65.

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MOBILE HOME WITH A NON-POLLUTING, ENERGY-CONSERVING DOMESTIC POWER SYSTEM.
Engelhard Minerals and Chemicals Corporation, Engelhard Industries Division, 430 Mountain Avenue, Murray Hill, New Jersey 07974

Contract No. 68-02-1852, RFP No. Du-74-A286 .... *$55,015*
SIMULATIONS OF SO2 DIFFUSION IN THE AREA OF CLAIRTON, PENNSYLVANIA.
Calspan Corporation, Post Office Box 235, Buffalo, New York 14221

Contract No. 68-02-0631, Modification No. 7 .... *$25,868*
CONTINUING THE STUDY OF WET SCRUBBING OF SO2 IN A RESEARCH MODEL PILOT SCRUBBER.
Monsanto Research Corporation, Dayton Laboratory, 1515 Nicholas Road, Dayton, Ohio 45407

Contract No. 68-02-1710, RFP No. Du-74-B434 .... *$38,652*
COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM - BIRMINGHAM.
University of Alabama, 1919 Seventh Avenue, Birmingham, Alabama

Contract No. 68-02-1843, RFP No. Du-74-X067 .... *$98,356*
ENVIRONMENTAL STUDIES WITH REGARD TO RETROFITTING SELECTED INDUSTRIES FOR CONVERSION TO LOW BTU GAS.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-1708, RFP No. Du-74-B432 .... *$51,200*
COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM.
University of California at Riverside, Riverside, California 92502

Contract No. 68-02-1709, RFP No. Du-74-B433 .... *$28,850*
COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM - UTAH.
Utah State Division of Health, 44 Medical Drive, Salt Lake City, Utah 84173

Contract No. 68-02-1712, RFP No. Du-74-B436 .... *$48,229*
COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM - LOS ANGELES.
Copley International Corporation, 7817 Herschel Avenue, P. O. Box 1530, La Jolla, California 92037

Contract No. 68-02-1750, RFP No. Du-74-B534 .... *$99,965*
COMPARE PULMONARY CARCINOGENICITY OF KNOWN CARCINOGENS WITH AND WITHOUT ADDED H2SO4 MISTS AIRBORNE RESPIRABLE PARTICLES AND GASES.
New York University Medical Center, 550 First Avenue, New York, N. Y. 10016

Contract No. 68-02-1749, RFP No. Du-74-B426 .... *$81,750*
DEVELOPMENT OF AN OPTICAL METHOD FOR THE MEASUREMENT OF THE MASS CONCENTRATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES.
Meteorology Research Inc., Box 637, Altedena, California 91001

Contract No. 68-02-1748, RFP No. Du-74-B514 .... *$93,560*
DEVELOP SAMPLING SYSTEM FOR POWER PLANT EMISSIONS THAT PERMITS QUANTITATIVE MEASUREMENT OF TOTAL MERCURY AND VANADIUM EMISSIONS.
Esso Research & Engineering Co., P. O. Box 8, Linden, New Jersey 07036

Contract No. 68-02-1821, RFP No. Du-74-A231 .... *$48,890*
SURVEY OF EMISSIONS CONTROL AND COMBUSTION EQUIPMENT DATA IN INDUSTRIAL PROCESS HEATING.
Institute of Gas Technology, IIT Center, 3424 South State Street, Chicago, Illinois 60616

Contract No. 68-02-1951, RFP No. Du-75-C073 .... *$14,542*
VINYL CHLORIDE ANALYZER SYSTEM CONSISTING OF VINYL CHLORIDE ANALYZER CALIBRATION SYSTEM ELECTROCHEMICAL HYDROGEN GENERATOR AND RELATED COMPONENTS.
The Bendix Corporation, Process Instrument Division, Corner Monroe and Chestnut Street, Ronceverte, West Virginia 24970 (NOTE: Contract contains options in the amount of $37,608)

Contract No. 68-02-1846, RFP No. Du-74-C811 .... *$17,401*
TRAINING, EDITING AND WRITING SERVICES OF THE ENVIRONMENTAL PROTECTION AGENCY PERSONNEL.
Robert Ventre Associates, Inc., 4720 Montgomery Lane, Washington, D. C. 20014 (NOTE: Contract contains options in the amount of $30,264)

Contract No. 68-02-1847, RFP No. Du-74-C811 .... *$24,925*
TRAINING, EDITING AND WRITING SERVICES OF THE ENVIRONMENTAL PROTECTION AGENCY PERSONNEL.
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SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1974

42406 **APTIC NO. 66542**

Barrett, R. E., D. W. Locklin, and S. E. Miller

INVESTIGATION OF PARTICULATE EMISSION FROM OIL-FIRED RESIDENTIAL HEATING UNITS (FINAL REPORT). *Battelle, Memorial Inst., Columbus, Ohio, Columbus Labs., American Petroleum Inst. and Environmental Protection Agency Contract 68-02-0239, Task 9, Program Element 1AB015, Rept. EPA-650/2-74-026, ROAP 21AFE-07, 49p., March 1974. 6 refs.*

Two residential oil fired heating units (a warm air furnace and boiler) were fired in the laboratory while Bacharach smoke and filterable particulate emissions were measured at several excess air levels for both cyclic and steady state runs. Particle size distributions were measured during runs on the boiler to determine if particle size variations might help explain the lack of correlation between smoke and particulate emissions, based on earlier field measurements. Particulate emissions varied with excess air in the same pattern as smoke number, being higher at low excess air levels for both units. Correlations between smoke and particulate emissions appeared practical for individual units firing at specific operating conditions. Over 80% of the particles were below 1.0 micron and particle size distributions were nearly identical for all runs. (Author abstract modified)

42407 **APTIC NO. 66559**

Bee, R. W., G. Erskine, R. B. Shaller, R. W. Spewak, A. Wallo, III, and W. L. Wheaton

COKE OVEN CHARGING EMISSION CONTROL TEST PROGRAM-VOLUME 1 (FINAL REPORT). *Mitre Corp., McLean Va., Environmental Protection Agency Contract 68-02-0650, Interagency Agreement F192628-71-C- 002, Program Element 1AB013, Rept. EPA-650/2-74-062, ROAP 21AFF-004, M74-45, 181p., July 1974.*

A coke oven charging emission control test program was conducted at the P4 battery of the Jones and Laughlin Pittsburgh Works between April 1971 and May 1974. Atmospheric pollutants from the coking process charging operation was quantified. The pollutant abatement system (an improved design larry car versus an existing larry car) was evaluated. The feasibility of a compliance monitoring system concept based on optical measurement was determined. Emission characteristics of the charging operation was defined in terms of both gases (total hydrocarbons, carbon monoxide, carbon dioxide, nitrogen oxides, sulfur dioxide, methane, hydrogen sulfide, ammonia, phenol, and cyanide) and particulates (containing tar and benzpyrenes). Emissions were defined from leaking seals on the pusher side doors of the oven. (Author abstract modified)

42408 **APTIC NO. 66550**

Brun, M. J.

PLASTIC MATERIALS IN PACKAGING MATERIALS. *(Situation des matieres plastiques dans l emballage). Text in French. C.I.T.E.P.A. (Technical Interprofessional Study Center for Air Pollution), Etudes Documentaires 42, CI 803, 14p., 1974. 2 refs.*

The general problem of plastic materials and their effect on waste disposal, and the particular problem of air pollution due to the incineration in waste incinerators are discussed. When incinerated, plastic materials except for polyvinyl chloride cause no pollution since they form carbon dioxide and water at normal incineration temperatures. The polyvinyl chloride whose proportion in domestic waste currently ranges from 0.8 to 1.2% emits some 50% of its hydrochloric acid content when incinerated, which may cause corrosion problems. The HCl concentration in the flue gas reaches values up to 1 g/N cu m, which is then reduced to about 0.2 mg/cu m due to dispersion and dilution. The HCl emission can be substantially reduced by meanns of wet type dust separators, and by the addition of powdered lime, magnesia, or calcium carbonate in the incinerator.

42409 **APTIC NO. 66264**

Haeberle, M.

ODOR INVENTORY OBTAINED WITH THE NOSE. TRACE ANALYSIS, EMISSION MONITORING, AIR POLLUTION, ODOR SENSE, REDUCTION OF EMISSION SOURCES. *(Geruchskataster per Nase). Text in German. Umschau Wiss. Tech., 74(17):549-550, 1974. 1 ref.*

A complete study of the chemical industry s odor problem was made by BASF-Aktiengesellschaft in 1972 relating various odors found in the neighborhood of individual plant sources and marking the extension of odor areas, which were put on transparent films, using different colors. The same study was made one year later and due to many abatment programs in individual plants a reduction in odor areas of 50 to 75% was found. Odor panels were used.

42410 **APTIC NO. 66260**

Harke, H. -P.

THE PROBLEM OF PASSIVE SMOKING. I. THE INFLUENCE OF SMOKING ON THE CO CONCENTRATION IN OFFICE ROOMS. *(Zum Problem des Passivrauchens. I. Ueber den Einfluss des Rauchens auf die CO-Konzentration in Bueroraeumen). Text in German. Int. Arch. Arbeitsmed., 33(3):199-206, 1974. 5 refs.*

For several days, continuous carbon monoxide measurements were carried out in office rooms in which smokers and nonsmokers were working. The office buildings are situated in Hamburg. In the air-conditioned building 1 and in building 2, without air-conditioning, a mean CO level exceeding 5 ppm (30-minute values) was not observed. In the two office rooms of building 1 a 30-minute value exceeding 5 ppm CO could not be measured. Only once, for a very short time a value of more than 7 ppm CO was recorded. This may be explained by the possibility that a cigarette was held relatively close to the inlet of the measuring device. In the two office rooms of building 2 a mean 30-minute value exceeding 5 ppm CO could not be registered. However, in both rooms a CO concentration (30-minute values) of up to 7 ppm, and in one case of up to 9 ppm was measured. This concentration was obtained in a room with a volume of 78.3 cu m, occupied by three smokers. In this room the CO concentration increased up to 15.6 ppm, however, only at very short intervals.

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42411 **APTIC NO. 66262**

Harke, H. -P. and H. Peters

THE PROBLEM OF PASSIVE SMOKING. III. THE INFLUENCE OF SMOKING ON THE CO CONCENTRATION IN DRIVING AUTOMOBILES. *(Zum Problem des Passivrauchens. III. Ueber den Einfluss des Rauchens auf die CO-Konzentration im Kraftfahrzeug bei Fahrten im Stadtgebiet). Text in German. Int. Arch. Arbeitsmed., 33(3):221-229, 1974. 6 refs.*

Carbon monoxide measurements were made in automobiles of different types on a route of 15.35 km through Hamburg. The route included autobahn, main roads, and by-streets. Two rides were made each day in the morning after rush hour. During the first ride no cigarettes were smoked; during the second ride, two of the four passengers smoked simultaneously two cigarettes each. The doors and windows of the car were closed. Ventilation varied as follows: ventilation O, air jets closed, blower off; ventilation 1/2, air jets open, blower off; ventilation 1, air jets open, blower on. The CO level in the car distinctly increased during smoking but decreased to ambient levels within two to three min after smoking. This observation was also made in an unventilated car. The absolute carbon monoxide value depended on ventilation and speed. At one measuring point during a smoking period the mean concentration of CO at ventilation O was 21.4 ppm; at ventilation 1/2 it was 15.7 ppm; and at ventilation 1 it was 12.0 ppm. Under the same conditions at ventilation 0 the mean CO concentration was 12.1 ppm at about 80 km/hr and 24.3 ppm at about 35 km/hr.

42412 **APTIC NO. 66263**

Harke, H. -P., W. Liedl, and D. Denker

THE PROBLEM OF PASSIVE SMOKING. II. INVESTIGATIONS OF CO LEVEL IN THE AUTOMOBILE AFTER CIGARETTE SMOKING. *(Zum Problem des Passivrauchens. II. Untersuchungen ueber den Kohlenmonoxidgehalt der Luft im Kraftfahrzeug durch das Rauchen von Zigaretten). Text in German. Int. Arch. Arbeitsmed., 33(3):207-220, 1974. 6 refs.*

In an automobile of the lower middle-class the carbon monoxide concentration was measured after cigarette smoking. The car was occupied by four persons and only the driver was a non-smoker. Experiments were carried out in a wind tunnel. The doors and windows of the car had been closed and the motor was off. At a relative wind velocity of 0 and 50 km/hr ventilation varied as follows: ventilation 0, air jets closed, blower off; ventilation 1/2, air jets open, blower off; ventilation 1, air jets open, blower on. In the first series of experiments, each of the three smokers smoked simultaneously in the following pattern: smoking period 9.0 min, time not smoking 19.4 min, smoking period 9.6 min. Experiments with the air jets open were stopped after a further 3.2 min, and experiments with the air jets closed were followed by a nonsmoking period of 9.5 min, a smoking period of 9.0 min, and again a nonsmoking period of 4.3 min. In the second series of experiments, one after another of the three smokers smoked a cigarette. In experiments with the air jets closed, six cigarettes were smoked within 49.5 min; and in experiments with air jets open four cigarettes were smoked within 30 min. In the experiments with a relative wind velocity of 50 km/hr and ventilation 0, 1/2, or 1, as well as at 0 km/hr and ventilation 1, a stable CO level was observed after a few minutes of smoking. In the abovementioned experiments the CO concentrations decreased in just a short time to ambient CO levels in nonsmoking periods. The equilibrium of concentration depended on the number of cigarettes smoked simultaneously (not on the absolute number of cigarettes smoked) as well as on ventilation and relative wind velocity.

42413 **APTIC NO. 66227**

Hazard, H. R.

CONVERSION OF FUEL NITROGEN TO NOX IN A COMPACT COMBUSTOR. *J. Eng. Power, 96(3):185-188, July 1974. 4 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine Division, Annual Meeting, Winter, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/GT/2.)*

The effects of fuel nitrogen content and excess air upon nitrogen oxide emission in a Rankine-cycle engine were investigated. A low N2 fuel, ASTM Jet A aviation kerosene, was doped with increasing amounts of pyridine to increase the amount of chemically bound N2. It was burned at a rate of 50 lb/hr in a compact combustor incorporating staged air admission with a rich primary zone, and water cooling of the walls. Each increase in fuel N2 content resulted in a significant increase in NOx in the combustion products. Up to 90% of the fuel N2 was converted to NOx at very low N2 levels, decreasing to 55% conversion at higher levels. These results are consistent with data reported for large steam boilers and for small residential boilers. Emission standards requiring very low levels of NOx emission will require use of fuels with very low nitrogen content. (Author abstract modified)

42414 **APTIC NO. 64429**

Hermann, Peter

COMPILATION OF MEASURED DATA ON FLUORIDE EMISSION IN BRICKWORKS. *(Die messtechnische Erfassung der Fluoremissionen bei Ziegeleien). Text in German. Ziegelind. (Wiesbaden), no. 4:148-151, 1974. 12 refs.*

Methods for the quantitative determination of gaseous fluoride emissions and actual measurements of fluorine emissions from brickworks are presented. Gas samples for fluorine emission measurement are taken through a heated quartz tube in an absorber containing 0.1-2 N sodium hydroxide solution. The fluorine ion concentration in the absorbent solution is determined by ion-selective silver-silver chloride electrode in fluorine- potassium chloride with lanthanum fluoride crystal as membrane. Actual measurements of the fluorine concentrations in brickworks revealed fluorine emissions ranging from 0.5 to 200 g/cu m, and emission rates of 6-1900 g/hr. The fluorine input with the raw material was found to be 0.003-0.13%. Up to 50% of the fluorine present in the raw material was found in the emitted waste gas.

42415 **APTIC NO. 66363**

Hermann, P.

THE MEASUREMENT OF FLUORINE EMISSIONS FROM BRICK KILNS. *(Die messtechnische Erfassung der Fluoremissionen bei Zeigelein). Text in German. Gesundh.-Ingr., 95(9):263-267, 1974. 13 refs. (Presented at the Second Symposium on Branch-specific Emissions, Fluorine Emissions by Brick Kilns, Munich, Feb. 1, 1974.)*

Gaseous fluorine compounds were absorbed according to the VDI (Verein Deutsche Ingenieur) guideline draft 2470 by means of a heated quartz probe in caustic soda and determined with the F2 sensitive electrode. The emission concentrations and the emission of gaseous F2 compounds from brick kilns were between 0.5 and 200 mg F/cu m and 3 and 1900 g F/hr. The F2 quantities entered with the raw material ranged from 0.003% to 0.13%. The relative emission fluctuates between several percent and about 50% of the fluorine quantity present in the raw material.

42416 **APTIC NO. 66168**

Ikegami Makoto, Etsuzo Kawai, and Yuji Fujimura

FORMATION OF OXIDES OF NITROGEN IN A DIESEL ENGINE (IN THE CASE OF SWIRL CHAMBER TYPE). *Bull. JSME (Japan. Soc. Mech. Engrs.), 17(109):944-950, July 1974. 11 refs.*

Reduction of nitrogen oxides emitted from diesel engines is one of the urgent problems to be solved from the viewpoint of photochemical smog. However, their formation is not fully understood, and the effects of engine variables on their emissions are still not well known. Nitric oxide emission was investigated with a swirl chamber diesel engine by systematically changing some engine parameters. Some factors effective to flame cooling suppress the NO formation at lower fuel-air equivalence ratios, while they have less effect at higher ratios. In the latter range, the NO decreases with this ratio, which is attributable to the increase in the local fuel-overrich zone somewhere in the combustion space, and its decrease is largely dependent on the outflow of gas from the swirl chamber into the main chamber. (Author abstract modified)

42417 **APTIC NO. 63130**

Jinbo, Motoji

THE MECHANISM OF DUST SCATTERING AND DIFFUSION. *(Funjin hisan to kakusan no kiko). Text in Japanese. Preprint, Japan Society of Chemical Engineers, Tokai Branch, Nagoya, p. 24-29, 1974. (Presented at the Japan Society of Chemical Engineers, Tokai Branch, Study Meeting on Behavior of Microparticles and Dust Collection, 32nd, Nagoya, Japan, Jan. 25, 1974.)*

The mechanism of dust scattering from material yards, scrap yards, highways, and other sources is studied. With regard to the force which removes resting powder particles into the air current, four types of dynamics can be considered: vertical partial speed, repelling power, pressure difference, and magnus effectiveness. The basic factors for scattering resting particles, then, are the floating force which is determined by the wind velocity, and the horizontal current resistance which moves the particles horizontally and sometimes rotates them simultaneously. The effects of wind velocity, exposure time, particle size and material, the behaviors and diffusion of particles in the air current, dust emission sources and quantities are all mathematically analyzed, and finally the scatterability and suspendability of particulates are briefly discussed.

42418 **APTIC NO. 66448**

Lahre, Thomas and William Vatavuk

SUPPLEMENT NO. 3. COMPILATION OF AIR POLLUTANT EMISSION FACTORS (SECOND EDITION). *Office of Air Quality Planning and Standards, Research Triangle Park, National Air Data Branch, AP-42/3, 55p., July 1974. 107 refs.*

NTIS: PB 235736

Data are reported on those atmospheric emissions for which sufficient information exists to establish realistic emission factors. Particulate, sulfur oxide, carbon monoxide, hydrocarbon, nitrogen oxide, aldehyde, hydrogen chloride, fluorides, and organic sulfur compounds are among the types of emissions surveyed. Emission factors are tabulated for: bituminous coal combustion without control equipment, natural gas combustion, liquefied petroleum gas combustion, wood and bark waste combustion in boilers, sewage sludge incinerators, iron and steel mills, primary lead smelting processes without controls, secondary lead smelting furnaces without controls, sulfate pulping, pulpboard manufacturing, and plywood manufacturing.

42419 **APTIC NO. 66366**

Lustgarten, George

MODEL STUDIES CONCERNING MIXTURE FORMATION AND COMBUSTION IN THE DIESEL ENGINE. *(Modelluntersuchungen zur Gemischbildung und Verbrennung im Dieselmotor). Text in German. Motortech. Z. (Stuttgart), 35(9):273-281, 1974. 8 refs.*

Model studies concerning mixture formation and combustion in a diesel engine were first carried out for a fuel jet and were then expanded for the combustion process. A liquid model permits determination of the temporal and local mixing conditions in the combustion chamber. The combustion process within the studied range was controlled by the macro-mixture formation. Chemical reaction and droplet evaporation play a subordinate role. The study of the mixture formation with the liquid model shows incomplete mixing in the jet upon termination of injection. The complete disappearance of zones with air deficiency occurs only after a multiple of the injection duration has passed. Causes for this are the fading of the turbulence in the combustion chamber as well as the decrease of the concentration of the educts. For optimum design of the combustion system a homogeneous and rapid macro distribution of the fuel is desirable. The combustion chamber geometry decides the number of holes in the nozzle and the nozzle diameter.

42420 **APTIC NO. 62686**

Mitchel, J. Murray, Jr., Richard E. Felch, Donald L. Gilman, Frank T. Quinlan, and Ralph M. Rotty

VARIABILITY OF SEASONAL TOTAL HEATING FUEL DEMAND IN THE UNITED STATES. *National Oceanic and Atmospheric Administration, Washington, D. C., Special Task Group, p. 5-9, Jan. 1974. 3 refs.*

The extent to which National total demand for heating fuels in the 1973-1974 season will depend on the weather was investigated. A straight-forward probability analysis of the nationwide variability of seasonal total heating degree days (temperature- related measure of fuel demand widely used in industry) based on the geographical distribution of heating fuel demand provided a valuable guide for national planning. Fairly reliable assessments can be made of the risk of unusual weather-related heating fuel demand in the United States during the 1973-1974 winter heating season. For the nation as a whole the risk of unusually high or unusually low seasonal total demand is tabulated.

42421 **APTIC NO. 66286**

Morgenstern, P., L. N. Morgenstern, K. M. Chng, D. H. Barrett, and C. E. Mears

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS IN 51 AIR QUALITY CONTROL REGIONS. *Walden Research, Cambridge, Mass., Div. of Abcor, Inc. and Environmental Protection Agency, Durham, N. C., EPA Contract 68-02-0049, Task 8 and 11, 20p., April 25, 1974. 6 refs.*

A modeling analysis of power plants was conducted in 51 air quality control regions to determine if compliance extensions at these plants could significantly reduce the projected deficit of low sulfur coal. The total projected 1975 annual coal consumption by the power plants analyzed is 290 million tons. Under state implementation plans conditions, 176 million tons of this demand is projected for low S coal (less than 1% S). After application of the allowable variance status, a net decrease in demand for about 137 million tons of low S coal can be made. The compensating effects of the variances are a net increase of 36 million tons of 1-1.5% S coal, a net decrease of 8 million tons of 1.5-2% S coal, and a net increase of 109 million tons of greater than 2% S coal.

42422 **APTIC NO. 66527**

Nack, H., K. Murthy, E. Stambaugh, H. Carlton, and G. R. Smithson, Jr.

DEVELOPMENT OF AN APPROACH TO IDENTIFICATION OF EMERGING TECHNOLOGY AND DEMONSTRATION OPPORTUNITIES (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Contract R-802291, Program Element 1AB015, Rept. EPA-650/2-74-048, ROAP 21AFH-016, 273p., May 1974. 12 refs.*

NTIS: PB-233 646/AS

A methodology for characterizing major industries was developed based on present environmental impact and the probable effect of emerging process technology on environmental considerations. A systematic method is developed for separating the industries into process modules. The applicability of this approach is demonstrated using as examples the petroleum refining and secondary nonferrous metals industries, each with substantially different characteristics. The air contaminants from the process equipment in a petroleum refining plant include hydrocarbons, carbon monoxide, particulates, sulfur and nitrogen compounds, and odorous materials such as mercaptans. Atmospheric emissions from the secondary nonferrous metal industry consist of metallic materials such as lead, zinc, mercury, arsenic, cadmium, antimony, precious metals, magnesium, nickel, copper, manganese, and aluminum. Expert opinion for rapid identification of emerging technology was utilized and technology under development in the two industries is discussed. (Author abstract modified)

42423 **APTIC NO. 64431**

Newton, C. D., W. W. Shephard, and M. S. Coleman

STREET RUNOFF AS A SOURCE OF LEAD POLLUTION. *J. Water Pollution Control Federation, 46(5):999-1000, May 1974. 4 refs.*

The accumulation of lead from automobile emissions in street runoff and surface streams is examined from theoretical calculations and experimental findings obtained by the Oklahoma State Department of Health. Assuming that 50% of the emitted lead is deposited on the roadbed and 100% of the lead on the roadbed is carried in the runoff, the average concentration of lead in the runoff from the streets is calculated to be 0.23 mg/l. Analysis of snow, ice, and water samples taken from roadbed surfaces after a winter storm gave concentrations of lead ranging from 3.6-8.5 mg/l, with the load concentration decreasing with increasing distance from the roadbed. Both the theoretical and experimental values are sufficiently large to indicate that street runoff can be a significant nonpoint source of lead contamination of surface water.

42424 **APTIC NO. 66189**

Samson, Alan B.

ORGANIC FINISHING INDUSTRIES ALERTED TO TOUGHER AIR QUALITY RULES AHEAD. *Metal Finishing, 72(8):42-43, 48, Aug. 1974.*

Proposed air quality rules for the organic finishing industry are discussed. All solvents would be placed into groups based upon their photoreactivity or ability to form ozone. Most severe limitations would affect glycol ethers and diacetone alcohol. The ethers are important in water-based coatings which were expected to replace solvent coatings eliminated under Rule 66 type regulations. Previously exempt solvents now have to be controlled because of the ability of weather conditions to transport solvents away from the source. The importance of downward transport and theories regarding the origin of hydrocarbons that react with nitrogen oxides to form O3 are discussed.

42425 **APTIC NO. 66116**

Ueno, Zene, Tadahiko Nagaoka, Katsuaki Kosala, Akira Morita, Seiki Koga, and Fumio Wagatsuma

HYBRID FUEL BURNING SYSTEM. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,792,669. 9p., Feb. 19, 1974. 4 refs. (Appl. Feb. 1, 1973, 15 claims).*

A hybrid fuel burning system which uses a solid or semisolid fuel of plastic polymers and a liquid oxidizer such as oxygen or hydrogen peroxide is described which is considerably smaller than similar prior art fuel burning systems and which can thus be used in mobile or portable applications. The liquid oxidizer is exothermically decomposed in the presence of a suitable catalyst and produces hot oxygen gas by which the solid or semisolid fuel is liquidized or gasified and combusted. The hot oxygen gas may be passed through at least one preheating chamber so that the fuel is preheated and emulsified before it mixes with the hot oxygen gas. The solid or semisolid fuel may be formed of waste plastic materials which are solidified to a block form, thereby contributing to the resolution of contamination problems resulting from plastic solid wastes. (Author abstract modified)

42426 **APTIC NO. 66141**

Venkataramani, R.

ENVIRONMENTAL CONCERNS AND DECISIONS FOR THE MINING INDUSTRY. *J. Inst. Engrs. (India) (Calcutta), vol. 54(MM2):45-49, March 1974. 2 refs. (Presented at the Mining and Metallurgy Division Annual Paper Meeting, Asansol, India, Jan. 19-20, 1974.)*

The problem of environmental control in the mining industry is reviewed. Since a cut back industrialization is an unacceptable solution to pollution, other control methods must be developed. The role of the mining industry in the economic development of a country, the environmental impacts due to mining, and engineering solutions to control pollution are discussed. Water, air, and land pollution are discussed. Although mining by itself may not be a major contributor to the air pollution, mining and related operations can pollute the atmosphere with particulate and gaseous substances. Mine fires, burning and nonburning abandoned coal refuse banks, fugitive dust from coal refuse banks and sources such as haul roads, blasting in surface mines, and mine exhaust from underground can all be sources of air pollution.

42427 **APTIC NO. 66308**

Vitale, Anne M. and Pierre M. Sprey

TOXIC POLLUTANTS. *In: Total Urban Water Pollution Loads: The Impact of Storm Water. Enviro Control, Inc., Rockville, Md., Council on Environmental Quality Contract EQC302, p. 108-110, 177-178, 1974. 2 refs.*

NTIS: PB 231730

The runoff of heavy metals, particularly lead in automobile exhaust, from urban streets during storm washoff is considered in terms of the problem of toxic heavy metal loads downstream and the need for the monitoring of such metals at water treatment plants. Estimated annual heavy metal street loads for various cities are tabulated for lead, chromium, copper, zinc, mercury, nickel, and total heavy metals. Lead values range as high as 265,000 lbs/yr, based on the lead content in gasoline and the amount of mileage traveled within a city. Total heavy metals range as high as 918,632 lbs/yr. Mathematical equations are given which were used to determine mass emissions from various storms.

42428 **APTIC NO. 66119**

Zweifel, Paul F. and Anita Guynn

ARE THERE VIABLE ALTERNATIVES TO NUCLEAR POWER? *Chemistry, 47(8):16-18, Sept. 1974. 14 refs.*

Alternatives to nuclear generation of energy, including fossil fuel conservation, are examined with the conclusion that major research and development efforts should be directed toward breeder reactors. Continued expansion of energy demand at its present rate, without imports and without synthetic fuel production, is estimated to result in exhaustion of America's gas and oil resources by 1989-2000 and 1988-2011, respectively. Although coal is estimated to be abundant enough to handle energy demands for the next 400 years, expenditures on coal gasification research do not seem warranted for this medium term solution in comparison with presently much smaller research funds for nuclear research.

42429 **APTIC NO. 66529**

Research Triangle Inst., Research Triangle Park, N. C.

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS VOLUME 8: COMPUTER-ASSISTED AREA SOURCE EMISSIONS GRIDDING PROCEDURE. *Office of Air Quality Planning and Standards Contract 68-02-1014, Program Element 2AH137, Rept. EPA-450/4-74-009, OAQPS Guideline 1.2-027, 108p., Sept. 1974.*

A semi-automatic method for distributing area source emissions on a sub-county basis is presented. Demographic information for census tracts within the county is used as the basis for the distribution of the emissions. The capability exists for inserting override factors for each designated sub-area within the county. This capability enables the user to redistribute portions of county-wide area source emissions if there is a better basis for doing so. The methodology may be used to estimate present emission distributions in the air quality maintenance analysis procedure. The override feature enables the methodology to be extended so that it may be applied to estimate future distributions of area source emissions more reliably. (Author abstract)

1973

42430 **APTIC NO. 64929**

Cesarz, Herbert M.

DUST EMISSIONS IN THE VICINITY OF COKING PLANTS. *(Staubimmissionen in der Umgebung von Kokereianlagen). Text in German. Schriftenr. Lagerstaettenerfassung Bodenbewegung Bergschaeden Ingenieurvermessung, no. 5:98-120, 1973. 4 refs. (Presented at the Colloquium Umweltschutz und Bergbau, Clausthal-Zellerfeld, May 10-11, 1973.)*

In 1959 dust fall measurements in the vicinity of 28 coking plants were begun. The long-term and short-term emission concentrations were calculated from the data measured over the 13-year period and are listed in a table. From the available data the results obtained in the vicinity of one coking plant are discussed in greater detail. The dust fall measurements at this coking plant were begun two years prior to operation of the plant in the period from Nov. 13, 1959 to Aug. 31, 1961. The measurements were taken at 20 points distributed around the coking plant to a distance of 2 km. The measurements were continued until 2 years after operation began. The results for the 4-year measurement period revealed no major increase of the dust fall on the long-term average. In the Northwestern neighborhood to a distance of 200 m from the plant the dust fall doubled after operation began at the plant. In more distant places with a higher dust fall prior to operation, the situation did not change after operation began. The higher dust fall was due to other sources. The highest dust falls were measured in the period October 1961 to January 1962 right after the plant began operation. In the following months the dust fall returned to the rate determined before operation began. The average long-term concentration calculated from the measurements was 0.77 g/sq m day, the short-term concentration 1.71 g/sq m day.

42431 **APTIC NO. 61777**

Naito, Hiroo

INDUSTRIAL POLLUTION AND THE STRUCTURE OF TOKYO. *(Tokyo no kojo kogai to toshi kozo). Text in Japanese. Tohoku Chiri (Ann. Tohoku Geogr. Assoc.), 25(4):201-207, 1973. 8 refs.*

The ratio of land used for factories in Tokyo changed from 16.7% in 1954 to 11.7% in 1969, and that of sub-industrial areas from 35% to 43.9% for the same period. The residential area remained in the range of 26%, and commercial area decreased from 21.4% to 18.5%. The main soot emission sources in the entire Tokyo is boilers, the number of which increased from 3118 to 10,006 between 1967 and 1972 in metropolitan Tokyo, and from 332 to 1557 in three Tama counties. In central Tokyo, most of these boilers are building boilers for heating and hot water. Sources other than boilers are metal heating furnaces, ceramic kilns, and incinerators, which are concentrated in the industrial areas along the Arakawa river. The amount of sulfur oxides is the greatest in the industrial area along Arakawa, east of the imperial place; and it amounts to 2608 tons (52.5%), (in the north, 1353 tons (27.2%), and in the south, 546 tons (11%)). Some factories have relocated or are in the process of relocating because of the complaints and appeals against bad odor, dusts, and toxic gases. Between 1968 and 1970, 53 plants moved from central Tokyo to the landfilled Haneda area, and 8 plants moved to the Tokyo-Yokohama metal Industrial belt in Kawasaki between 1969 and 1970. Presently, other metal fabrication and manufacturing and machinery industries are relocating further south along Tokyo Bay. The complaints registered by the Tokyo Metropolitan government in 1971 were 42% for noise, 7.1% for vibration, and 23.8% for gas and bad odor.

42432 **APTIC NO. 63141**

Ogami, Eiichi

HYGIENIC STUDIES ON THE COMPOSITION OF DUST PARTICLES PRODUCED AT THE TIME OF BURNING OF ANIMAL BODIES AND EXCRETA IN THE HEATING FURNACE. *Kurume Med. J., 20(4):219-224, 1973. 9 refs.*

Dust particles were collected from the dust box of a wet- or dry-type dust collector attached to a heating furnace for the burning of animal bodies and excreta. They were analyzed for constituent elements both qualitatively and quantitatively. Analysis was carried out by two instruments, a flat diffraction-spectrum camera and an atomic extinction spectrophotometer. Calcium, iron, magnesium, and silicon were the main constituents of dust particles. There was a tendency for the concentration of elements to be higher in dust particles collected from the dry dust collector than from the wet one. Iron content was high in dust particles collected from the wet collector. Elements which are particularly injurious to respiratory organs (aluminum, boron, cadmium, chromium, Mg, manganese, phosphorus, lead, Si, vanadium, and zinc) were found in the dust particles. (Author abstract modified)

42433 **APTIC NO. 62589**

Saijo, Tatsuya, Takeshi Nosaki, and Koichi Saito

THE STATE OF BAD ODORS IN IBARAKI-PREFECTURE. *(Ibaraki-ken no akushu no jittai ni tsuite). Text in Japanese. In: Ibaraki-ken Kogai Gijutsu Senta Kenkyu Hokoku. p. 85-97, July 1973. 7 refs.*

The odor pollution in the Kashima petrochemical and chemical processing industrial conglomerate which has been under investigation since May 1970 is evaluated. The odor intensity and odorous and harmful gases collected at and near the source of odor-causing materials were determined. Concentrations of sulfur dioxide, hydrogen sulfide, ammonia, formaldehyde, methyl mercaptan, dimethyl sulfide, and phenols were measured. The primary source of malodors in the petrochemical conglomerate was in sewage water containing sulfur compounds, as well as hydrocarbons and chloride compounds such as benzene, toluene, cyclohexane, dichloroethane, and chloroform. The mixture of these compounds produced complex odors. Malodors in the vicinity of paper mills were attributed to sulfur compounds such as CH_4S, H_2S, and C_2H_6S. The odor in chemical plants where phenolic resins are manufactured was attributed to C_6H_6O and CH_2O. However, the odor intensity in the surrounding areas of the plant was extremely low. In the plant where feathers, bones, and heads of chickens were used as materials, the odor intensity and ammonia concentration were extremely high, which was attributed to protein decomposition products. However, no malodor was detected at 500 m from the plant.

42434 **APTIC NO. 66233**

Uppal, Jai and Prabhat Krishna

MERCURY AIR POLLUTION IN CHLORO-ALKALI INDUSTRY--ITS IMPORTANCE, SOURCES, CONTROL AND COSTS. *Chem. Age India, vol. 24:285-293, May 1973. 26 refs.*

Sources of mercury emission in a caustic soda-chlorine plant were identified and various air pollution control techniques are discussed. The major atmospheric pollution sources are the hydrogen by-product streams which are either vented or used as a fuel (containing 2.3 g of Hg/cu m at 100 C); the cell end box ventilation air (containing 0.045 Kg to 0.54 kg of Hg/100 tons of chlorine produced for a discharge rate of 50 cu m/min at 16 C of air); and the cell room ventilation air (containing .225 to 2.25 kg/100 tons of Cl_2 produced for plants of 100 to 150 tons/day Cl_2 capacity). Control techniques include the use of mist eliminators in conjunction with cooling, chlorinated brine scrubbing, washing the gases with a solution of sodium hypochlorite and sodium chloride, and the use of solid adsorbents/absorbents like impregnated activated carbon and molecular sieves. A state of the art on the fourth stage of control (emissions of .00031 kg/100 tons of Cl_2) is presented. Operating costs for different levels of pollution control are estimated. (Author abstract modified)

42435 **APTIC NO. 66558**

Wendell, Larry L.

SOME INFLUENCES OF REGIONAL BOUNDARY LAYER FLOW ON ATMOSPHERIC TRANSPORT AND DISPERSION. *National Oceanic and Atmospheric Administration, Idaho Falls, Idaho, Atomic Energy Commission Contract, 24p., 1973 (?). 6 refs.*

NTIS: BNWL-SA-4819, Conf-731205--3

The scales on which most atmospheric transport and diffusion work has been carried out have been either on the order of less than a few km or over a few hundred km. Only recently has serious attention been turned to the intermediate scale on the order of a few tens of km. It is on this regional scale in the boundary layer of the atmosphere that air pollution problems are becoming more critical. Recent investigations in several areas of the western U. S. have shown that the atmospheric transport of pollutants is strongly affected by intermediate scale variations in the topography. This spatial variation in the flow can cause short-term emergency forecasts of plume transport or long-term site evaluation studies based only on the source winds to be seriously in error. Instances of severe vertical shear in wind speed and direction may also be traced back to regional scale variation in terrain height. (Author abstract)

42436 **APTIC NO. 62680**

Automotive Environmental Systems, Inc., Westminster, Calif.

A STUDY OF EMISSIONS FROM 1966-1972 LIGHT DUTY VEHICLES IN LOS ANGELES AND ST. LOUIS (FINAL REPORT). *Environmental Protection Agency Contract 68-01-0456, Rept. APTD-1505, 127p., Aug. 1973. 2 refs.*

NTIS: PB 231849/AS

Results are presented from a study of exhaust and evaporative emissions from light duty vehicles operating in Los Angeles and St. Louis to determine the contribution to atmospheric pollution by 1966-1972 model year vehicles. The tests determined the levels of hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen exhaust emissions, as well as hydrocarbon evaporative emissions. Exhaust emissions were measured using the 1975 Federal Test Procedure, while evaporative emissions were measured using the Sealed Housing for Evaporative Determinations technique in accordance with the Society of Automotive Engineers Technical Report J171. Topics covered in the report include: program objective; program design; test vehicle procurement; facilities and equipment; equipment qualification, calibration, and crosscheck; test procedures; and data handling. Appendices are provided for vehicle information summary, vehicle exhaust emissions results. and vehicle evaporative emission results.

42437 **APTIC NO. 66298**

California State Air Resources Board

AN INTERIM REPORT ON STATUS OF KAISER STEEL S EMISSION CONTROL PROGRAM. *Rept. 73-14-6, 14p., June 21, 1973.*

An interim report on the status of Kaiser Steel s emission control program is presented. The total emissions from the plant in tons/yr and tons/day of the various air pollutants, and the percentage contribution of most of these emissions to the total emission inventory for San Bernardino County are tabulated. The District has no county-wide information on the emissions of hydrogen sulfide, ammonia, or gaseous fluoride. Emissions of particulate matter total 5950 tons/yr, sulfur dioxide 13,400 tons/yr, nitrogen oxides as nitrogen dioxide 5220 tons/yr, carbon monoxide 34,000 tons/yr, organic compounds as methane 2920 tons/yr, H_2S 110 tons/yr, NH_3 183 tons/yr, and gaseous fluoride 438 tons/yr.

42438 **APTIC NO. 66346**

Federal Power Commission, Washington, D. C., Bureau of Power

STEAM-ELECTRIC PLANT AIR AND WATER QUALITY CONTROL DATA FOR THE YEAR ENDED DECEMBER 31, 1970 BASED ON FPC FORM NO. 67. SUMMARY REPORT (FINAL REPORT). *198p., July 1973. 8 refs.*

GPO

Air and water quality control data for the year of 1970 is presented based on a survey of 683 steam-electric plants. Total reported air quality control expenses reached $71.3 million in 1970, an increase of nearly $12 million over the previous year; the bulk of the increase was for the collection and disposal of ash. Estimated particulate emissions decreased from 4293 to 4250 thousand tons, despite an increase in total ash content of all coal burned by steam-electric plants, due to performance upgrading of existing precipitators and to new equipment installation. Removal of sulfur oxides from flue gases remained in the experimental stage, having no significant effect on total emissions; consequently emissions of SOx increased in proportion to the growth in coal tonnage burned. Nitrogen oxides emissions remained at 4.22 thousand tons per million megawatt-hours, about the same as in 1969, due to the absence of any significant development in NOx control technology.

42439 **APTIC NO. 66449**

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

COMPILATION OF AIR POLLUTION EMISSION FACTORS. SUPPLEMENT NO. 2 (SECOND EDITION). *AP-42/2, 19p., Sept. 1973. 7 refs.*

NTIS: PB 235735

Data are presented on vehicular atmospheric emissions for which sufficient information exists to establish realistic emission factors. The data include: average carbon monoxide, hydrocarbon (exhaust, crankcase, and evaporation), nitrogen oxide, particulate (tire wear and exhaust), and sulfur oxide emission factors for highway vehicles based on nationwide statistics; CO, HC, and NOx emission factors for light-duty vehicles at low and high altitude; CO, HC, and NOx emission factors for light-duty vehicles in the state of California only; light-duty vehicle crankcase and evaporative hydrocarbon emissions by model year for all areas except California and for California only; CO, exhaust HC, and NOx deterioration factors for light-duty gasoline-powered vehicles in California and in all areas except California; sample calculations of weighted light-duty vehicle annual travel; and particulate and SOx emission factors for light-duty gasoline-powered vehicles.

1972

42440 **APTIC NO. 66512**

Martin, G. Blair and E. E. Berkau

AN INVESTIGATION OF THE CONVERSION OF VARIOUS FUEL NITROGEN COMPOUNDS TO NITROGEN OXIDES IN OIL COMBUSTION. *AIChE Symp. Ser., 68(126):45-63, 1972. 20 refs.*

The contribution of fuel nitrogen to total nitrogen oxides emissions from combustion sources was investigated. The variables studied were N_2 concentration, compound type, and furnace operating conditions. The most common fuels containing N_2

compounds are heavy oil and coal. The concentration of N2 ranges from 0.2% to 2.0% corresponding to 399 to 3000 ppm nitric oxide with 100% conversion. Fuel N2 conversion produced 2 to 15 times the NO produced by thermal fixation for the furnace studied. The fraction of fuel N2 converted increases with stoichiometric ratio (SR) and decreases with fuel N2 concentration. The absolute NO concentration in the flue gas increased with both SR and N2 concentration. The conversion to NO is less dependent on N2 compound type than on other factors. The fraction of fuel N2 converted to NO ranges from 0.20 to 0.70. The mechanisms of fuel N2 conversion proceeds by release of active N2 containing intermediates, followed by reaction of the intermediates with oxygen to form NO. Two-stage combustion appears a likely control strategy for control of fuel NO. (Author conclusions modified)

42441 **APTIC NO. 66342**

Sinha, A. K. and P. C. Thakur

COPING WITH RESPIRABLE DUST. *Coal Mining Process., 9(12):47-48, 56, Dec. 1972.*

The hazards and prevalence of respirable coal dust are discussed. Respirable coal dust is less than 10 micron in size. The 5 micron, and particularly 1 micron, and smaller are very critical with respect to human health and are responsible for pneumoconiosis. The permissible dustiness in U. S. coal mines after Dec. 30, 1972 is 2 mg/cu m. The percentage content of the less than 1 micron size range in samples from different coal of equal dustiness depends upon the coal type, with anthracite having the highest (72%) percentage. Respirable dust particles may be further classified as settling and nonsettling (0.6 micron and smaller) particles. A respirable dust sample drawn from mine air may comprise about 23 to 58% of nonsettling dust by mass. These particles are a serious health hazard outside and inside a coal mine. Control techniques for minimizing respirable dust concentration in the mine air utilize dust collection and/or suppression by the application of inertial forces and water sprays or other surfactants, or by dilution with air supplied in adequate quantities. Removal is poor for particles in the respirable size range, particularly for particles below 2 micron.

42442 **APTIC NO. 61032**

NIPPON KASEI CHEMICAL CO., LTD. *(Nippon Kasei Kabushiki Kaisha). 1972 (?). Translated from Japanese, 38p.*

The history of the Nippon Kasei Chemical Co., established in Sept. 1937, is reviewed. The company produces ammonia, urea, coke, and other chemicals. The equipment, production capacity, applications of the chemicals, and pollution control equipment are listed. The company also has a fertilizer manufacturing plant, a power plant, and several related companies. The topography of the factory is reviewed.

42443 **APTIC NO. 66517**

Office of Emergency Preparedness, Washington, D. C., Interagency Working Group

THE POTENTIAL FOR ENERGY CONSERVATION. A STAFF STUDY. *230p., 181 refs.*

GPO

A study on energy conservation measures suggests that the United States energy demand by 1980 can be reduced by as much as the equivalent of 7.3 million barrels/day of oil which is about two-thirds the projected oil imports for that year. Federal and state pollution control regulations, however, are likely to result in the additional use of energy and increase the demand for environmentally clean fuels. The combined effect of air quality control plans required of the states under the Clean Air Act might require importing as much as 1 billion barrels of low sulfur oil for use mainly in electric power generation in 1975. The Act also requires a major reduction in automobile pollution which, when fully implemented in 1976, will introduce a fuel penalty of 5% or more for each technique needed to control different emissions. A fully equipped car (1976 or later) will experience a 15-30% fuel penalty over a comparable 1967 model. Energy conservation programs should consist of measures to make pollution control systems more energy efficient and should encourage greater energy conservation by choosing applications which will both reduce energy consumption and pollution.

1971

42444 **APTIC NO. 60680**

Palcza, J. Lawrence

STUDY OF ALTITUDE AND MACH NUMBER EFFECTS ON EXHAUST GAS EMISSIONS OF AN AFTERBURNING TURBOFAN ENGINE. FINAL REPORT. *Naval Air Propulsion Test Center, Trenton, N. J., Aeronautical Turbine Dept., Federal Aviation Administration Contract DOT-FA71WAI-207, Work Unit No. 201-721-097, Rept. FAA-RD-72-31, NAPTC-ATD-212, 26p., Dec. 1971. 10 refs.*

NTIS,DDC: AD 741249

A TF30-P-412 augmented turbofan gas turbine engine was tested at simulated altitudes and Mach numbers to determine the effects of these parameters on the emission of unburned hydrocarbons, nitric oxide, carbon monoxide, smoke, and total particulates. Emission measurements were made between idle and maximum afterburning, at altitudes from sea level to 70,000 ft, and over a Mach range from 0-1.8. Test results indicated that within areas of efficient engine component operation altitude and Mach number effects on emission levels were negligible. Particulate samples collected revealed close agreement of particle size to data collected during previous ground tests.

1970

42445 **APTIC NO. 66555**

Els, Casper Jacobus

AIR POLLUTION BY DUST IN A FERTILIZER PLANT. *(Die meting van lugbesoedeling deur stof by n misstofnywerheid). Text in Afrikaans. Potchefstroomse Universiteit vir Christelike Hoer Onderwys (South Africa). Thesis (M.S.), March 1970, 127p. 28 refs.*

The dust-generated air pollution at the granulation plant and the mill section of a superphosphate fertilizer plant was measured. The dust sampler developed by the Chemical Engineering Group was used for dust sampling. The waste gases exhausted from the drying and cooling drums contained 1.201 to 12.721 g dust/N cu m. The grain size distribution of the captured dust was also determined. The need is emphasized for regular dust fall measurements by means of adhesive paper around fertilizer plants.

1969

42446 **APTIC NO. 59768**

McCurdy, Thomas Richard

VEHICULAR EMISSIONS AND THE LOCATION OF HIGHWAYS IN URBAN AREAS. *Pennsylvania State Univ., University Park, Center for Air Environment Studies, National Air Pollution Control Administration Grant AP 00022-06, CAES Rept. 154-70, 224p., Sept. 1969. 122 refs.*

Vehicular emissions are considered in relation to the location of highways in urban areas. Actual air pollution levels experienced in traffic are examined for hydrocarbons oxides of nitrogen, lead, carbon monoxide, smoke, and asbestos particulates; while maximum allowable community concentrations and health effects are reviewed for oxidants (ozone and peroxyacyl nitrates), carbon monoxide, lead, oxides of nitrogen, and hydrocarbons. Future trends are examined in terms of travel levels, emission standards, and control strategies such as altering gasoline fuel and power plants. Traffic corridor planning considerations applicable to minimizing the effects of vehicular air pollution are considered in terms of absorption of pollutants at the roadway, traffic flow control, micrometeorological factors control, open space considerations, open space planting considerations, and highway locational factors.

CONTROL METHODS

1974

42447 **APTIC NO. 63403**

Abe, Kenzo and Masanori Kimura

ODOR REMOVAL FOR SANITATION FACILITIES. *(Seiso shisetsu no akushu bojo). Text in Japanese. Akushu No Kenkyu (Odor Research J. Japan), 3(4):39-45, March 1974. 3 refs.*

The typical gases contained in the exhausts of a sanitation plant or sewage treatment plant are hydrogen sulfide and ammonia emitted from the chute, storage tank, pre-storage tank, pre- treatment system, pre-treatment filter tank, separation tank, digestion tank valve, aeration tank, dilution adjustment tank, pump chamber, desulfurization pit wash, desulfurizer, and the water-tight parts of the gas tank. The HS concentration in the gas from the digestion tank is usually 1.4-1.6% and is extremely high. The treatment system discussed here combines deodorization reactions for both high and low concentrations of odor-producing gases. The system is advantageous in economizing the installation cost, running cost, maintenance cost, and in using less space than two separate systems. The mixture of odorous gas, ammonia, and hydrogen sulfide is led to the first absorption tower, and a countercurrent contact is achieved between rising gas and descending water. This eliminates water soluble ammonia. Then the gas is sent to the second absorption tower, where the pH-controlled alkaline absorbent and gas are contacted by spray and countercurrent movement, and HS is eliminated. The clean gas is emitted in the air. The absorbent is used again in the third absorption tower for the treatment of the high-concentration HS gas from the digestion tank. The HS is completely absorbed. The digestion gas minus HS is stored in the gas holder, and the heat is recovered and used for heating the digestion tank.

42448 **APTIC NO. 66382**

Ackermann, Paul

PROCESS FOR THE PURIFICATION OF GASES. *(Polycarbona Chemie GmbH, Hamburg, West Germany) U. S. Pat. 3,793,808. 9p., Feb. 26, 1974. 3 refs. (Appl. Dec. 13, 1971, 1 claim).*

A process for washing industrial waste gases which contain foam- forming substances is described which is less costly and more efficient than prior art washing or scrubbing devices not specifically designed for gases containing foam-forming constituents. The process consists of atomizing an aqueous washing liquid into 50-150 micron diameter droplets for slow descent in a tower containing the gas to be washed at a rate requiring a period of greater than 2 sec. The vertical descent of the gas is slowed relative to the liquid droplets to allow for the droplets to fall into a sump at the bottom of the tower. The aqueous washing liquid is recirculated from sump up to the atomizer in the top of the tower. (Author abstract modified)

42449 **APTIC NO. 66582**

Adams, Harry

SEWAGE TREATMENT ODOR CONTROL BY COUNTERACTION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 158-164. (March 7-8.)*

The application of a counteractive odor control procedure to a sewage treatment plant is described. Gaseous odors are collected using strippers, blowers, or existing ventilating systems; while a reodorant known as Kermatrol R/O is atomized into the gas stream, with the reactive gas being eventually vented to the atmosphere. The system requires only an atomizer, a blower, and a mixing chamber, with essentially no maintenance being required. Application rates and costs are listed for the stripping tank, storage tanks, vacuum pump effluent, filter rooms, and replacing the afterburner. A potential untested application of Kermatrol is the application of the reodorant to the vapor space in the sewer lines carrying the sludge.

42450 **APTIC NO. 66117**

Agarwal, M. R.

WASTE DISPOSAL AND UTILISATION IN THE FERTILISER INDUSTRY. *Indian Chem. J. (Bombay), 8(12):17-20, June 1974.*

Solid, liquid, and gaseous waste disposal and utilization innovations are reviewed for the manufacture of nitrogenous and phosphatic fertilizers. Methods of treating airborne wastes include: conversion of hydrogen sulfide to sulfur dioxide and eventually to sulfuric acid or alternatively conversion of H_2S to sulfur at fertilizer ammonia plants; the use of ammonia plant nitrogen wash tail gas for either low heating value purposes or for catalytic reduction of nitrogen oxides from nitric acid plants by virtue of the hydrocarbons present in the tail gas; the use of cyclones, filters, or wet scrubbers for reducing dust emissions from urea plants and nitrolime plants; the use of catalytic combustion, caustic/soda ash scrubbing, or increased absorption volume to reduce the NO_x content in nitric acid plant stack emissions; the use of mist eliminators and double absorption units to reduce sulfur oxide and acid mists from sulfuric acid plants; and the recovery of fluorine as useful hydro-fluo-silicic acid from phosphoric acid plants.

42451 **APTIC NO. 66235**

Atsukawa, Masumi, Kazumi Kamei, Toshihiko Furumoto, and Nikushi Tsuneyoshi

PROCESS FOR WASHING SULFUR OXIDE-CONTAINING GASES WITH A SLURRY OF LIME. *(Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,794,714. 5p., Feb. 26, 1974. 4 refs. (Appl. Nov. 16, 1971, 2 claims).*

A process for washing sulfur oxide-containing gases with a slurry of lime is presented in which the attachment of scale to the inner surfaces of the absorbing units is prevented, thus precluding the need for washing or mechanical scraping of scale associated with prior art lime scrubbing methods. The process consists of passing the gas from a first absorbing unit to a second absorbing unit while passing a sulfur oxide absorbing liquid from the second absorbing unit to the first absorbing unit and occasionally reversing the flow directions of the gas and absorbing liquid. (Author abstract modified)

42452 **APTIC NO. 66396**

August, Paul

DEVICE FOR THE AFTER TREATMENT OF EXHAUST GASES OF AN INTERNAL COMBUSTION ENGINE. *(Assignee not given.) U. S. Pat. 3,793,830. 8p., Feb. 26, 1974. (Appl. May 19, 1972, 11 claims).*

A catalytic afterburner device for the reduction of hydrocarbons, nitrogen oxides, and carbon monoxide in automotive exhaust gases is described which overcomes prior art drawbacks of incomplete exhaust detoxification and power loss. The main flow passage for the exhaust gases is surrounded by another passage having therein axially arranged treatment chambers containing catalyst material. The main flow passage is provided with a flow control valve which, at low engine speeds, diverts substantially all of the exhaust gases to the outer passage surrounding the main flow passage, while at higher speeds the valve deflects and permits an ever increasing amount of the exhaust to pass through the main flow passage. The main flow passage and the outlet end of thye passage containing the catalyst chambers are coaxially arranged and taper inwardly so that there is a mingling of the gases from the passages at the discharge end of the device. The device is adapted for direct connection to the exhaust manifold of an engine and can be incorporated directly therein. (Author abstract modified)

42453 **APTIC NO. 66365**

Awerbuch, N.

WASTE AIR COMBUSTION WITHOUT EXTRA COSTS. *(Abluftverbrennung ohne Sonderausgaben). Text in German. Wasser Luft Betrieb, 18(9):494-497, 1974.*

In all cases where there is no demand for developing waste heat and where catalytic oxidation cannot be applied because of the presence of catalyst poisons, i.e., where waste air must be burned, the waste air is usually preheated by the waste heat developing from waste air combustion in a heat exchanger to save fuel. Such heat exchangers are expensive and consume much energy. The can be replaced by combustors where through pulsating flows a heat transfer speed is achieved which is three to six times higher than in conventional heat exchangers. With relatively little power demand relative velocities of 50 to 200 m/sec can be realized. The operating principle of combustors is briefly outlined. In the past few years solid metal combustors have undergone further development toward high-temperature operation (flame temperature to 2500 C), so that a general application for boiler heating has become feasible.

42454 **APTIC NO. 66176**

Ayers, Karl C., Lee W. Clutter, and Alfred B. Adams, Jr.

KRAFT ODOR CONTROL AT MEAD PAPERS. *TAPPI, 57(9):125-128, Sept. 1974. 2 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Environmental Conference, New Orleans, La., April 16-19, 1974.)*

A new kraft mill was started in Escanaba, Mich. in 1972 with a major objective of designing a mill that would satisfy the community and the state environmental standards. The main potential problem was odor control. Engineers visited many locations and brought together the best features found in America and Sweden. The odor controls included digester evacuation, flow heat recovery without a gas accumulator, steam stripping, brown-stock washer gas collection, caustic addition to the lime kiln scrubber, plus incineration of miscellaneous sources. The resulting mill had very effective control of total reduced sulfur odors. Air monitoring programs undertaken at the plant were ambient air, special odor source, and continuous source monitoring. (Author abstract)

42455 **APTIC NO. 66581**

Baker, Richard J.

CONSIDERATIONS IN THE SELECTION OF A SCRUBBER AGENT TO DEODORIZE THE EXHAUST AIR OF A PELLET MILL COOLER. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 151-157. 7 refs. (March 7-8.)*

Technical considerations are reviewed for the selection of a scrubber agent to deodorize exhaust air from pellet mill coolers in the feed and grain industry. Feed pellets, which use animal fats as a binding agent and caloric supplement, undergo hydrolysis or oxidation when exposed to hot, humid conditions and give off odors resulting from chemical breakdown to peroxides or aldehydes. Parameters necessary for consideration in the design of an appropriate scrubbing system are: percent of air contaminant in the exhaust gas stream, the required control equipment efficiency, the exhaust gas volumes, and all factors effecting the solvent-solute relationship within the scrubbing agent. The compound to be absorbed should be highly soluble in the scrubber agent selected, and the inlet stream of the scrubber agent should be temperature conditioned for maximum solubility if necessary.

42456 **APTIC NO. 66568**

Ball, D., G. Smithson, R. Engdahl, and A. Putnam

STUDY OF POTENTIAL PROBLEMS AND OPTIMUM OPPORTUNITIES IN RETROFITTING INDUSTRIAL PROCESSES TO LOW AND INTERMEDIATE ENERGY GAS FROM COAL (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Contract 68-02-1323, Task 1, Program Element 1AB013, Rept. EPA-650/2-74-052, ROAP 21ADD-30, 143p., May 1974. 46 refs.*

Commercial coal gasification processes and fuel gas cleanup processes applicable to coal gasification were analyzed. The potential problems in retrofitting existing industrial processes to the use of low or intermediate energy gas from coal are explored. The Lurgi, Kopper Totzek, and Winkler gasification processes are used extensively outside the United States for gasifying coal and producing town gas. The Wellman-Galusha process is used commercially in the U. S. for making low energy gas. Commercial processes are available for reducing particulate and sulfur levels in the fuel gas well below environmental requirement. No cleanup processes are available for cleaning the fuel gas at temperatures above 1000 C, and thus increasing the overall thermal efficiency of the process through utilization of the sensible heat in the gas. Potential problems in retrofitting processes are analyzed. Processes where retrofit is most attractive are identified and their annual energy requirements are estimated. (Author abstract modified)

42457 **APTIC NO. 66395**

Basshuysen, Richard van

DEVICE FOR REDUCING HARMFUL CONSTITUENTS OF THE WASTE GASES IN INTERNAL COMBUSTION ENGINES OF AUTOMOBILES. *(Audi Nsu Auto Union Aktiengesellschaft, Neckarsulm (West Germany)) U. S. Pat. 3,793,833. 4p., Feb. 26, 1974. 6 refs. (Appl. Nov. 12, 1971, 3 claims).*

A thermal reactor system for reduction of automotive exhaust emissions is described which overcomes prior art disadvantages of increased fuel consumption and premature ignition due to the reactor cooling faster than the engine itself. The waste gas reactor is fitted on the engine exhaust pipe in which the unburned waste gas components are burned, with the addition of air if necessary. The system is equipped with a combustion time control that can be adjusted for a predetermined time on starting in the direction of the retarded ignition by the diminished pressure in the suction duct. (Author abstract modified)

42458 **APTIC NO. 62756**

Beavon, David Kent

IMPROVED PROCESS FOR REDUCING SULFUR CONTENT OF EFFLUENT GAS STREAMS. *(Parsons (Ralph M.) Co., Los Angeles, Calif.) Brit. Pat. 1,344,472. 6p., Jan. 23, 1974. (Appl. Jan. 12, 1971, 22 claims).*

An improved process for reducing sulfur content of effluent gas streams is described. This process is similar to a previously described one except hydrogen sulfide is recovered by absorption in a liquid absorber, e.g., an aqueous alkaline salt solution, and preferably with oxidation of the H2S to free sulfur. A continuous process was developed for reducing the S content of an effluent gas stream consisting of enriching the effluent gas stream with a source of hydrogen to a level which is at least equal to the stoichiometric amount of H_2 required to convert sulfur dioxide and free S contained in the gas stream to H_2S; catalytically hydrogenating the enriched gas stream at a temperature of from 300 F to 1200 F to convert substantially all of the contained SO_2 and free S to H_2S; and removing the H_2S from the hydrogenated gas stream by contacting the hydrogenated gas stream with liquid absorbent for H_2S.

42459 **APTIC NO. 66238**

Beg, S. A. and M. Taheri

GAS ABSORPTION STUDIES IN A BUTTERFLY VALVE SCRUBBER. *Atmos. Environ., 8(9):947-955, Sept. 1974. 19 refs.*

Gas absorption and pressure drop studies were carried out in a wetted butterfly valve constituting a novel scrubber system. The exceptional suitability of this device is demonstrated by its flexibility to adjust to large variations in both gas and liquid flow rates. An experimental set-up with a maximum air flow rate of 400 cu ft/min and a water flow rate of 4 g/min was constructed to provide the desired testing conditions. Gas absorption data were obtained with an air-ammonia and water system. Equilibrium efficiencies of 100% were obtained for a pressure drop greater than 20 in. of water. The data were comparable with the collection efficiencies of sub-micron particles obtained with the same scrubber. Morever, the fundamental mass transfer data for the system were obtained for a wide range of operating conditions. (Author abstract)

42460 **APTIC NO. 66157**

Bhatia, Staya P., Steven Prahacs, Thomas L. de Souza, and Herbert G. Jones

USE OF PHENOLIC COMPOUNDS FOR THE SIMULTANEOUS ABSORPTION AND OXIDATION OF OBJECTIONABLY ODORIFEROUS SULPHUR COMPOUNDS FROM A GASEOUS STREAM. *(Pulp and Paper Research Inst. of Canada, Pointe Claire, Quebec (Canada)) U. S. Pat. 3,794,711. 16p., Feb. 26, 1974. 5 refs. (Appl. April 27, 1971, 34 claims).*

A method for the removal of any combination of the compounds methyl mercaptan, dimethyl sulfide, and hydrogen sulfide, particularly as found in odorous emissions from kraft pulp mills, is presented as a superior alternative to other methods which are either more expensive, require regeneration of the reacting mixture, or have little capacity for absorbing organic sulfur compounds. The removal is achieved by the use of alkaline or near neutral scrubbing solutions containing defined minimum amounts of certain phenolic compounds such as phenol, dihydroxy phenols, trihydroxy phenols, substituted phenols, and derivatives thereof as additional scrubbing agents in the presence of gaseous oxygen. The procedure increases the absorption efficiency of the alkaline aqueous solution, with the hydrosulfide ions being instantaneously converted to soluble sulfate and thiosulfate ions. (Author abstract modified)

42461 **APTIC NO. 63043**

Birke, Lutz Georg, Aksel Jebens, Ivar Eystein Ruyter, and Froystein Dyvik

PROCESS FOR THE REMOVAL OF MERCURY FROM GASES. *(Det Norskezinkkompani A/S, Odda (Norway)) Brit. Pat. 1,342,222. 4p., Jan. 3, 1974. (Appl. Jan. 14, 1972, 5 claims).*

A process for the removal of mercury from gases, particularly those formed during oxidation processes, is described. The process is characterized in that the gases are washed with sulfur acid having a concentration of at least 50% and a temperature of 60-180 C, and that the washing acid and the gases contain chlorine and/or chlorine compounds in such an amount that the atomic ratio Cl/Hg is at least 1:1, to convert practically all the Hg and all the Hg compounds present in the gas feed into mercury chlorides which are separated by condensation in the succeeding cooling of the gas. The use of washing acid consisting of at least 50% H_2SO_4 results in the oxidation of decomposition of the Hg compounds, such as those forming the above mentioned adducts, which in other processes would normally manage to pass through the system, so that they can then immediately react to form Hg_2Cl_2.

42462 **APTIC NO. 63319**

Block-Bolten, A., B. J. M. Bertrand, and S. N. Flengas

OXIDATION OF CO TO CO_2 IN MELTS CONTAINING V_2O_5 AND ALKALI OXIDES. *Can. J. Chem., 52(11):2068-2072, June 1, 1974. 38 refs.*

The conversion of carbon monoxide to carbon dioxide in the presence of vanadium pentoxide dissolved in a melt containing potassium oxide and other alkali metal oxides was investigated in the temperature range 440 to 640 C. Carbon monoxide may be oxidized to CO_2 with a high overall reaction efficiency in a system of reactors connected in series. Molten salt solutions have the advantage over solid catalysts in that they operate without being poisoned. The oxidizing capacity of these solutions is limited only to the depletion of V_2O_5 in the melts due to reaction and by the presence of large amounts of insoluble V_2O_4 solid which is a reaction product. The melts may be reactivated by treatment with oxygen. The system is capable of oxidizing CO with a reasonably high efficiency in CO compositions representing the pollutant gas mixture emitted by the exhaust of motor vehicles. (Author abstract modified)

42463 **APTIC NO. 66127**

Boki, Keito

STUDIES ON THE ADSORBENTS FOR THE ADSORPTION REMOVAL OF HYDROGEN SULFIDE GAS: 2. ON SEVERAL ACTIVE CARBONS AS THE ADSORBENTS. *(Ryuka suiso gasu kyuchaku jokyo no tame no kyuchakuzai no kansuru kenkyu: 2. Kasseitan kyuchakuzai ni tsuite). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 30(3):121- 128, June 25, 1974. 21 refs.*

Various types of active carbons are tested as adsorbents for hydrogen sulfide gas removal. Three active carbons adsorb more H_2S than the others and are studied in terms of specific surface areas with argon gas, free energy changes of adsorption, the heat of adsorption, and entropy changes of adsorption. The limiting adsorption capacity and reclaiming ability of one of the active carbons found most effective are also examined; three or four treatments result in a 50% decrease in the amount of H_2S adsorbed, though reclamation to original adsorption capacity is achieved by treatment with 1% sodium hydroxide solution. The three active carbons found most effective for H_2S adsorption are one and a half times as effective as silicate adsorbents tested.

42464 **APTIC NO. 66128**

Boki, Keito

STUDIES ON THE ADSORBENTS FOR THE ADSORPTION REMOVAL OF HYDROGEN SULFIDE GAS: 3. ON SEVERAL ZEOLITES AS THE ADSORBENTS. *(Ryuka suiso gasu kyuchaku jokyo no tame no kyuchakuzai ni kansuru kenkyu: 3. Zeoraito kyuchakuzai ni tsuite). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 30(3):129-134, June 25, 1974. 15 refs.*

Tests were performed on 12 types of zeolites to investigate their suitability as adsorbents for hydrogen sulfide gas removal. Adsorbed H_2S was measured gravimetrically at temperatures of 1.5 and 30 C and at pressures up to 50 mm mercury. Studies were also performed on the relationship between the amounts of H_2S adsorbed and the specific surface areas with argon gas, free energy changes of adsorption, heats of adsorption, and entropy changes of adsorption. Adsorption efficiency was found greater for three of the zeolites tested (synthetic zeolite F-9, molecular sieve 13X, and molecular sieve 5A for gas chromatography), with H2S adsorption being directly proportional to the heats of adsorption and inversely proportional to positive entropy changes of adsorption. Adsorption capacity of the zeolites was reclaimed by various treatments at 110 C, 0.0001 mm Hg, 1 hr to original adsorption capacity. The three most effective zeolites adsorbed three times as much H2S as silicate adsorbents tested.

42465 **APTIC NO. 66588**

Boscak, Vladimir

PILOT SCALE TESTS ON ODOR ABATEMENT FROM PAINT OVEN OPERATION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 214-223. 10 refs. (March 7-8.)*

Three water-based top coat paints were cured in a pilot scale oven under various conditions to evaluate the use of such paints, as opposed to solvent-based types, from an odor emission standpoint. Odor emission concentration was relatively low, though high volumetric flow rates still presented a serious odor problem. A pilot scale venturi-packed tower scrubber was evaluated for controlling the odors, and moderate reductions in both odors and hydrocarbon emissions were achieved. Best results were obtained when cold water was used as the scrubbing liquid in both stages, using sodium hydroxide in the venturi and potassium permanganate in the tower. Preliminary tests on the curing of powder paints indicated very low odor concentrations. Samples taken on the inlet and outlet side of the odor control equipment were analyzed using the American Society for Testing and Materials Dilution Method Designation D 1391-57 and a gas chromatograph. The best odor reduction achieved amounted to 60%. (Author abstract modified)

42466 **APTIC NO. 66397**

Bourne, Ronald Frederick

FILTERS FOR SEPARATING DUST FROM AIR. *(The Asbestos Grading Equipment Co. (South Africa) (Proprietary) Ltd., Johannesburg, Transvaal (South Africa)) U. S. Pat. 3,793,811. 4p., Feb. 26, 1974. 3 refs. (Appl. April 28, 1972, 4 claims).*

A filter arrangement for separating dust from air is described which results in greater efficiency and a reduced volume of air required for cleaning the bags compared to prior art designs. The arrangement consists of a filter chamber in an outer annular region of a casing and a contaminated air inlet on a central region surrounded by the filter chamber. Circular rows of filter bags are located in the outer annular region, and a rotary air jet is provided for creating sequential back pressure in the bags. Positioning of the filter chamber in the outer region of the casing permits greater available space for filter bags in a casing of given size and results in improved efficiency. (Author abstract modified)

42467 **APTIC NO. 66196**

Brandt, J., H. Heer, and G. J. Clessuras

CRITERIA FOR ELECTROSTATIC COLLECTION OF UNFAVORABLE DUCTS. *J. Eng. Power, 96(3):161-169, July 1974. (Presented at the American Society of Mechanical Engineers, Annual Meeting, Winter, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/Pwr-3.)*

The separation of dusts of high electrical resistance in an electrostatic precipitator is discussed. Design criteria for a precipitator are presented that serve to protect the electrodes in continuous operation against a heavier dust layer. The resistance of the dust in the low temperature region, about 300 to 400 F, is mainly based on the surface conductivity. In the higher region it is based on the conductivity of the material. The surface conductivity can be influenced considerably by conditioning of the flue gases as water vapor and sulfur trioxide. The advantages of the lower dust resistance are opposed by the disadvantages of the increased flue gas volume and the reduced dielectric strength of the flue gas. The specific resistance of various fly ash components relative to the temperature is illustrated. The increase of the flue gas temperature to achieve a more favorable dust resistance region for utility boilers is generally accomplished by installing the electrostatic precipitators ahead of the air preheaters.

42468 **APTIC NO. 62412**

Bratzler, K. and A. Doerges

AMISOL PROCESS PURIFIES GASES. *Hydrobcarbon Process., 53(4): 78-80, April 1974. 10 refs.*

The Amisol process is described, and process tests and applications are reviewed. This process completely desulfurizes gases with low carbon dioxide content. The washed gases have residual sulfur levels of 0.1 ppm or less. The process is particularly suitable for purification of gases with medium or low CO2 and hydrogen sulfide contents such as from oil gasification for ammonia or methanol synthesis and production of pure hydrogen. It can also be applied for CO2 removal down to a level of 5 ppm or less; therefore, for purification of gas for oxo synthesis of aldehydes and derivatives, particularly higher alcohols. The process uses methanol as the basic solvent with an additive and an organic gas to attain high gas dissolving capacity. The solvent dissolves gases are that are not absorbed chemically and chemically absorbs sour gas components such as CO2, H2S, and hydrogen cyanide.

42469 **APTIC NO. 66191**

Cole, E. R., Jr., W. M. Dressel, and M. M. Fine

VAPOR PHASE REDUCTION OF LEAD SULFIDE. *Bureau of Mines, Rolla, Mo., Rolla Metallurgy Research Center, RI 7926, 12p., 1974. 15 refs.*

A lead smelting process for the vapor phase reduction of lead sulfide is described. Ten and 100 g samples of PbS mill concentrates were vaporized at 1000 to 1100 C in a furnace with an inert gas atmosphere during a 2 hr period. The PbS vapor was transported by the inert carrier gas to the reduction zone of the furnace where it was reduced at the same temperature with excess hydrogen to metallic Pb. Lead of 99.9% purity was produced. The hydrogen sulfide formed can be decomposed into elemental sulfur and water vapor by a modified Claus process. Approximately 90% of the copper and 70% of the silver and zinc remain in the residue and are potentially recoverable. More than 98% of the Pb in the concentrates were extracted. (Author abstract modified)

42470 **APTIC NO. 66203**

Cox, John L., Warrack G. Willson, and Edward J. Hoffman

CONVERSION OF ORGANIC WASTE TO FUEL GAS. *J. Environ. Eng. Div., Am. Soc. Civ. Eng., 100(EE3):717-732, June 1974. 19 refs. (Presented at the Division of Fuel Chemistry, American Chemical Society National Meeting 165th, Dallas, Tex., April 1973.)*

Results are presented from experiments with a multiple catalyst, single stage reactor system employed for the conversion of various organic waste materials to methane, carbon dioxide and hydrogen, with a CO2-free heating value that exceeds 7.92 kcal/l in many instances, a value generally accepted for substitute natural gas. The overall conversion is pressure independent over the range of 2.2-17.7 atm, with the optimum conversion temperature being strongly dependent upon the composition of the feed materials and the primary gaseous reactants produced from the steam carbon reaction. Temperatures of 600-700 C give satisfactory conversions with all feed materials tested. The occurrence of both methanation reactions which are exothermic and reactions between steam and feed materials which are endothermic within a single-stage reactor provides mutual benefit, i.e., heat needed by the endothermic reaction is supplied by the exothermic reaction. Conversion conditions, product quantity, and composition are tabulated for various feed materials. (Author summary modified)

42471 **APTIC NO. 66585**

Cross, Frank L., Jr. and Glenn E. Benson

THE FEASIBILITY OF REMOVING HYDROGEN SULFIDE FROM A PAPER MILL COATING MACHINE BY ADSORPTION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 195-199. 5 refs. (March 7-8.)*

Two feasibility studies, presented separately, are described for the removal of hydrogen sulfide from a paper mill coating machine by adsorption and H2S removal from a similar device by ozonation. Adsorption of H2S is not ultimate disposal, and for economic reasons the carbon adsorbent must be regenerated. Pilot plant operation could be necessary to define the air velocities through the carbon adsorption bed and the H2S adsorption rate on the carbon. The occurrence of carbon disulfide with H2S in the paper mill coating operation is likely to present a more difficult collection problem than H2S alone. Total installed cost of a carbon adsorption system, with regeneration, would be approximately $1,500,000. Operating costs are difficult to define prior to pilot operations.

42472 **APTIC NO. 66586**

Cross, Frank L., Jr. and Glenn E. Benson

CASE STUDY IN ODOR CONTROL THE FEASIBILITY OF REMOVING HYDROGEN SULFIDE BY OZONATION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 200-203. 5 refs. (March 7-8.)*

A feasibility study was conducted for the removal of odorous hydrogen sulfide from paper manufacturing plant emissions. In- stack ozonation may be an effective and feasible control method for low H2S concentrations, though pilot operations could be necessary to establish the feasibility. As much as 30 sec retention time may be necessary for ozone to mix with the process effluents and oxidize the H2S, though it may be possible to obtain proper mixing at the fan and eliminate the 30 sec delay. Estimated overall equipment cost for a system to react with 3 lbs of H2S/hr is $166,000, and installation cost for the equipment, including a reactor chamber to provide proper residence time, is estimated at $75,000-$100,000.

42473 **APTIC NO. 66086**

Curtis, Vernie

ANTI-POLLUTION DEVICE. *(Assignee not given.) U. S. Pat. 3,791,315. 7p., Feb. 12, 1974. 11 refs. (Appl. July 8, 1971, 14 claims).*

An anti-pollution system for precipitating and collecting combustion pollutants produced by furnaces is described which differs from prior art precipitators in its design. A fluid transport medium, such as a pump, is used to introduce and intermingle a steady and constant stream of atmospheric air with the products of combustion. The air transport medium is arranged either between the furnace and the first fluid treatment vessel or between several fluid treatment vessels. Each fluid treatment vessel is provided with a spray system that produces a dense fine fog spray for separating the products of combustion from the air and accumulating them in a sump in the vessel. An additional chamber is provided in which a series of filter elements are positioned, the arrangement being such that the input of effluvia is traversed sequentially through each filter, with the effluent being discharged to the atmosphere. A valve means is provided in the feed line extending between the furnace and the pump for feeding atmospheric air to the gas stream to further enhance combustion.

42474 **APTIC NO. 66383**

Das, Gregory Prem

AUTOMOTIVE ENGINE EXHAUST PURIFIER. *(Raymond Lee Organization, Inc., New York) U. S. Pat. 3,793,807. 3p., Feb. 26, 1974. 6 refs. (Appl. June 27, 1972, 1 claim).*

An automotive exhaust emission purification system, unlike any prior art devices, is described in which the exhaust gas is passed through a series of tanks containing a mixture of saline solution and a solution of trisodium phosphate. A primary tank, which is filled to three-quarters of its height with the wash solution by a supply tank of the solution, is vented to two additional auxiliary tanks also containing the solution and also is vented for the relief of any excess pressure. The tanks may be located adjacent the engine section of the automobile and behind the front headlight and fender section for optimum cooling. The lower sections of all tanks are lined with removable filter elements which retain the solid particles that have precipitated out of the liquid when the liquid is released from the tanks through the individual drain pipes located at the bottom of each tank.

42475 **APTIC NO. 64734**

Deline, John W.

METHOD OF REDUCING EMISSION OF POLLUTANTS IN EXHAUST GAS FROM AN INTERNAL COMBUSTION ENGINE AND MATERIAL THEREFOR. *(Assignee not given.) U. S. Pat. 3,787,328. 6p., Jan. 22, 1974. 10 refs. (Appl. July 23, 1971, 5 claims).*

A process is described for reducing pollution in the exhaust gas by contacting the hydrocarbons and carbon monoxide, thereby absorbing and adsorbing the hydrcarbons on a cellulosic material (rice hulls and ground corn cob) which in turn are used to oxidize the carbon monoxide. The process also includes removing from the exhaust gas a portion of those gases that contribute to the production of photochemical smog and, also, reducing the amount of CO gas by oxidizing them with a chemical activator selected from the group consisting of copper oxide, copper chloride, and compounds of the transitional elements. The cellulosic material may be moistened and a part preferably charred. Prior attempts have been too expensive to manufacture and operate, complex in maintenance and operation, or ineffective. (Author abstract modified)

42476 **APTIC NO. 66316**

Dolbear, Geoffrey E. and Gwan Kim

VARIATION OF SELECTIVITY WITH SUPPORT CHEMISTRY IN NOX REMOVAL CATALYSTS. *Preprint, Grace (W. R.) and Co., Columbia, Md., Davison Chemical Div., 17p., 1974 (?). 7 refs.*

Silica, alumina, and silica-alumina supports for platinum and platinum-nickel catalysts were studied using synthetic automotive exhaust mixtures at temperatures of 800-1100 F to investigate the relationship between the nature of the supporting oxide and catalyst selectivity toward nitrogen versus ammonia in strongly reducing streams such as those encountered during nitrogen oxide removal from automobile exhaust. The results are presented in terms of nitric oxide removal activities, ammonia disappearance activities, and ammonia- nitric oxide reaction stoichiometry; and the reaction of NO with adsorbed NH3 in competition with NH3 desorption is given as an explanation for the findings. Ammonia desorption is affected by the chemistry of the support, though ammonia decomposition is not an important reaction on the catalyst when water vapor is present. (Author abstract modified)

42477 **APTIC NO. 66198**

Dressel, W. M., P. G. Barnard, and M. M. Fine

REMOVAL OF LEAD AND ZINC AND THE PRODUCTION OF PREREDUCED PELLETS FROM IRON AND STEELMAKING WASTES. *Bureau of Mines, Washington, D. C., RI 7927, 16p., 1974. 14 refs.*

Studies on the removal of lead and zinc and the production of prereduced pellets from iron and steelmaking wastes are summarized. Over 2 million tons of steel furnace dust containing approximately 100,000 tons of Zn and 10,000 tons of Pb are produced each year. Recycling of the dusts would conserve mineral resources, lessen land area requirements for disposal, decrease pollution problems, and aid in solving the balance of payment problem. Steelmaking dusts can be pelletized and thermally treated to remove Pb and Zn and to reduce the iron oxide to form metallized pellets. In laboratory tests more than 99% of the Zn and 85% of the Pb was volatilized from the dust by roasting at 1000 C in carbon monoxide. The volatilized material can be collected and treated further for Pb and Zn recovery. Reduction and volatilization of over 95% of the Zn and most of the Pb was achieved by roasting self-reducing mixtures of steel furnace dusts and high carbon steelmaking wastes in an inert atmosphere at 1100 C. Over 80% of the iron in the resulting pellets was metallized. (Author abstract modified)

42478 **APTIC NO. 66471**

Eisentraut, Kent J., Robert L. Tischer, and Robert E. Sievers

RARE EARTH BETA-KETOENOLATE ANTI-KNOCK ADDITIVES IN GASOLINES. *(Assignee not given.) U. S. Pat. 3,794,473. 5p., Feb. 26, 1974. 4 refs. (Appl. Sept. 20, 1972, 16 claims).*

A motor fuel is described for spark ignition internal combustion engines which improves the antiknock properties of aviation and automotive fuels. It consists essentially of gasoline and a small amount of a rare earth, beta-ketoenolate, as an antiknock agent. Use of this agent to replace lead as an antiknock agent enables automobiles to use catalytic afterburners to eliminate exhaust pollutants.

42479 **APTIC NO. 66281**

SONIC GAS COOLING SYSTEMS CUT AIR POLLUTION COSTS. *Environ. Sci. Technol., 8(13):212-213, March 1974.*

The use of sonic evaporative cooling equipment to precondition effluent gases is discussed. The use of ultrafine water sprays is helpful in pretreating gas streams to enhance the collection efficiency and reliability of the air pollution control system. Sonic atomizing nozzles and computerized analysis of gas conditioning problems permit the design of automated systems for cooling hot effluent gases. Many dusts, such as glass and cement, have inherently high resistivities and at normal collection temperatures of approximately 300 F cannot be properly collected unless humidity levels approaching 30% are achieved. Fine water sprays not only cool the hot gases but also condition the gas stream by raising the humidity level to enhance the collection efficiency of the precipitator. Such systems can be used to upgrade existing installations or to reduce the size and cost of new installations.

42480 **APTIC NO. 66381**

Fornoff, Louis Leonard

LOW TEMPERATURE REMOVAL OF MERCURY FROM GAS STREAMS. *(Union Carbide Corp., New York) U. S. Pat. 3,793,806. 4p., Feb. 26, 1974. 1 ref. (Appl. Sept. 25, 1972, 1 claim).*

A process is described for the removal of mercury vapor from gas streams which also contain water vapor by cooling the gas stream to zero F or below. The cryogenic process requires that the gas stream also contains a substance in its vapor state which freezes out as a crystalline solid at the selected temperature. In practice a hydrogen gas stream containing at least 2.6 times 10 to the minus 7 atmospheres of mercury vapor and at least 6 times 10 to the minus 3 atmospheres of water vapor is passed into a chamber containing surface in contact with the gas stream maintained at a temperature not greater than 0 F. The gas stream is cooled sufficiently to form crystalline ice from the water vapor, whereby the mercury is occluded in the ice. The crystalline ice and occluded mercury are retained in the chamber, while the mercury-depleted gas stream is passed to the atmosphere. The ice and occluded mercury are melted for recovery of the liquid mercury.

42481 **APTIC NO. 66226**

Frank, Robert L., Sidney G. Martin, and Clayton S. Smith

PROCESS FOR THE RECOVERY OF NON-FERROUS METAL VALUES FROM SULFIDE ORES AND THE REDUCTION OF GASEOUS EMISSIONS TO THE ATMOSPHERE THEREFROM. *(Morton-Norwich Products, Inc., Chicago, Ill.) U. S. Pat. 3,791,812. 15p., Feb. 12, 1974. 12 refs. (Appl. Dec. 20, 1971, 9 claims).*

A fluidized bed roasting process for the recovery of non-ferrous metal values from sulfide ores and the reduction of sulfur dioxide and chlorine formed during the process is described which precludes the use of chemical absorbing solutions as in prior art processes. The process consists of mixing the ore with an inorganic chloride of sodium, lithium, potassium, calcium, or magnesium, providing the mixture in a gas permeable state to a first stage heating or roasting zone while maintaining about 80-140% of the stoichiometric quantity of air therein, conducting exhaust gases from the first stage heating zone to a second stage heating or roasting zone which contains a roasted mixture from the first stage heating zone, replenishing the first stage roasting zone with fresh inorganic chloride-ore mixture, trapping exhaust gases from the second stage heating zone in water, and leaching the roasted mixture from the second stage heating zone with water to extract substantially all of the metal values as water soluble salts. The process reduces the emission of SO2 and Cl2 to the atmosphere by at least about 85% and upwards of 90% in preferred embodiments. (Author abstract modified)

42482 **APTIC NO. 66439**

Gallot, M. J.

HOW LONG TO WAIT FOR ELECTRIC AUTOMOBILES? *(A quand l utilisation du vehicule electrique)? Text in French. Pollut. Atmos. (Paris), 16(62):201-205, April-June 1974.*

Advantages and prospects of electrically powered automobiles are discussed. Electric vehicles, consuming electricity only when in motion, are economically comparable to conventional automobiles powered by internal combustion engines. They are advantageous ecologically because they cause no air pollution, and the air pollution they generate indirectly in thermal power plants which supply their energy can be controlled more efficiently than could be in conventional vehicles. In addition, the generation of electricity in nuclear power plants will help economize fossil fuels for transportation needs. Electric drive by means of lead batteries is currently possible mainly for public utility and small-size delivery vehicles, as well as for compact cars intended especially for city traffic.

42483 **APTIC NO. 66223**

Ghezzi, Umberto, Carlo Ortolani, and Pierluigi Dell Orto

PROGRESSION HOLE CARBURETORS METERING DESIGN AND THEIR BEHAVIOUR IN RELATION TO EXHAUST EMISSIONS. *(Dimensionamentio di carburatori con fori di progressione e studio del loro comportamento in relazione alle emissioni allo scarico). Text in Italian. Termotecnica (Milan), 28(3):157-163, March 1974. 4 refs.*

A discussion of experimental results achieved with roller bench, road, and European motor cycle progression hole carburetors developed for the Alfa Romeo models Alfetta and 2000 is presented. The types of carburetors used were the horizontal, double-bodied Dell Orto DHLA 40F s with three progression hole arrangements: five holes of the same diameter, five of different diameters, and six of the same diameter. The position of the progression holes essentially controls the level of the mixture relationship by varying the opening of the throttle. With the correct setting of the progression holes, excellent results of driveability and reduction of polluting substances--carbon monoxide and hydrocarbons--were obtained. The CO quantities, for example, were often 50% lower than the present European legal standard.

42484 **APTIC NO. 66089**

Grainger, Lewis M. D.

ANTI-POLLUTION GASIFIED LIQUID FUEL SYSTEM. *(Assignee not given.) U. S. Pat. 3,792,688. 5p., Feb. 19, 1974. 5 refs. (Appl. Nov. 9, 1972, 6 claims).*

An anti-pollution gasified liquid fuel system is described. The fuel tank of the system is heated first by an electric heater to begin the gasification followed by exhaust gas heat, or in a modified version completely by electric heat, while simultaneously air is bubbled through the liquid fuel to produce a gaseous fuel. The gaseous fuel produced can either be fed directly to the carburetor of an internal combustion engine or to the burner of a steam generator used to drive a reciprocating steam engine or a turbine.

42485 **APTIC NO. 66233**

Gundlach, Theodore F. and Arthur L. Hawthorne

AIR SCRUBBER. *(J.M.J. Industries, Inc., Belleville, Ill.) U. S. Pat. 3,792,568. 13p., Feb. 19, 1974. 9 refs. (Appl. Aug. 15, 1972, 14 claims).*

An air scrubber that can be used in combination with a continuous mining machine for removal of particulate and gaseous pollutants from mine faces is described which, unlike prior art devices, directs clean air back toward the mine face and can be carried by a continuous mining machine. The scrubber includes a duct located adjacent the mine face for removing polluted air at the face, a pollutant removal mechanism operatively connected to the duct for separating the pollutants from the air moving through the duct, and a second duct operatively connected to the pollutant removing mechanism for directing the resultant clean air back toward the mine face. A revolving rotor is mounted on the air scrubber along with a spray means for spraying the polluted air upon entry into the rotor or at any point in the rotor passage. Provisions are made for discharging the pollutant-laden liquid through a bottom rotor plate. (Author abstract modified)

42486 **APTIC NO. 66394**

Gustavsson, Karl Axel G.

GAS CLEANING APPARATUS. *(AB Bahco Ventilation, Enkoping (Sweden)) U. S. Pat. 3,791,109. 5p., Feb. 12, 1974. 14 refs. (Appl. Sept. 7, 1971, 3 claims).*

A gas scrubbing device is described which allows for more compact construction by the addition of the liquid absorption zone to the sedimentation tank. Sedimentation of the sludge is not deleteriously affected provided that the absorption zone is arranged in the sedimentation tank within a vertical downwardly open casing within which the treatment passage partially extends and into which the liquid conduit extending from the droplet separator issues. A conveying means directs the sediment to a discharge means which is arranged to be opened automatically by a control means in response to an increase in resistance to movement of the conveying means above a predetermined value.

42487 **APTIC NO. 66206**

Handa, Noritoshi

SYSTEM AND METHOD USED IN A GAS TURBINE ENGINE FOR MINIMIZING NITROGEN OXIDE EMISSION. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,792,581. 8p., Feb. 19, 1974. 8 refs. (Appl. Dec. 1, 1971, 9 claims).*

A system for minimizing nitrogen oxide emissions from a gas turbine engine is described which reduces the reaction intensity in the combustion chamber of the gas turbine by using a preliminary combustor to generate partially contaminated air for feeding into the primary air intakes of the turbine combustion chamber. The preliminary combustor includes primary air intakes communicating with the air compressor of the gas turbine engine for receiving primary air therefrom, additional air intakes communicating with the air compressor for receiving additional air as a diluent, a fuel injector communicating with the fuel pump of the gas turbine engine for receiving liquid fuel therefrom, and an outlet connected to the combustor or the air compressor upstream for introducing the diluted burned gases into the gas turbine combustor as primary air. Thus, the maximum temperature in the gas turbine combustion zone is effectively reduced with a resultant reduction in NOx emission. (Author abstract modified)

42488 **APTIC NO. 64817**

Hara, Orizo, Yoshihisa Hirai, and Katsushiko Deshimaru

A METHOD FOR RECOVERY OF BASES IN COKE FURNACE GASES. *(Kokusuro gasuchu no enkirui no kaishu hoko). Text in Japanese. (New Japan Steel and Chemical Industries (Japan)) Japan. Pat. Sho 49-23568. 3p., June 7, 1974. (Appl. Dec. 4, 1970, 1 claim).*

The recovery method for bases, particularly with high pyridine recovery rate, from coke furnace gases is described. In the existing method, the pyridine recovery rate is sacrificed for high efficiency recovery of ammonia as ammonium sulfate with high quality. In the method of this invention, the free acid concentration of mother liquor in the saturator is maintained at 6-8%, the slurry concentration at 60-80% and the ferric ion concentration less than 100 ppm. The pyridine recovery rate is reduced to less than 80% at free acid concentrations less than 6% and increased to 100% at concentrations higher than 8%. However, the particle size of ammonium sulfate is greatly deteriorated at free acid concentrations higher than 6%. The deterioration in particle size can be counteracted by increasing the slurry concentration to 60-80% compared to 30-50% in the existing method. Furthermore, the deterioration in particle size can be reduced by maintaining the ferric ion concentration below 100 ppm, since the trivalent ion is known to affect the crystal size. The recovery procedure is described with a flow sheet.

42489 **APTIC NO. 66399**

Hardt, Lothar

GROUNDING SYSTEM FOR TUBULAR COLLECTORS IN ELECTROSTATIC PRECIPITATING APPARATUS. *(Metallgesellschaft A.G., Frankfurt am Main (West Germany)) U. S. Pat. 3,793,802. 5p., Feb. 26, 1974. 5 refs. (Appl. June 8, 1972, 10 claims).*

A system for grounding electrodes in electrostatic precipitators is presented which overcomes prior art disadvantages of nonuniform current distribution over the collector electrode area, excessive space, and corrosion. Bibulous strips, preferably composed of a synthetic resin material, are adapted to collect the conductive liquid descending along the walls of polygonal collector electrodes, forming a conductor connecting the surface film of the tubes to one terminal of the power supply, generally the ground. The collecting surface of each tube preferably leads directly onto the bibulous strip as a result of the juxtaposition of the latter and the bottom edge of this surface. The strips thus extend at least partially, and preferably completely, around the periphery of the lower edge of the collector-electrode tube.

42490 **APTIC NO. 66536**

Hartman, Miloslav and Robert W. Coughlin

REACTION OF SULFUR DIOXIDE WITH LIMESTONE AND THE INFLUENCE OF PORE STRUCTURE. *Ind. Eng. Chem., Process Design Develop., 13(3):248-253, July 1974. 12 refs.*

A simple structural model is developed and used to correlate experimental results from kinetics studies on the reaction of porous particles of limestone with sulfur dioxide and oxygen in flue gas at high temperatures. The model incorporates parameters such as the porosity of the natural rock, its true theoretical density, the content of calcium carbonate, and its conversion to sulfate. Agreement between the model and the kinetic experiments implies that the reaction is strongly influenced by reduction in porosity caused by the sulfation reaction, with both the reaction rate and the porosity becoming very small at conversions of about 50%. The pore-size distributions of unsulfated calcines and sulfated samples are remarkably different. Pores with a radius larger than 3980 Angstroms are probably responsible for the high capacity of limestone to react with SO2. Incomplete conversion of calcium oxide results from the strong diffusional resistance developed in the interior of the particles owing to reduction in porosity as the reaction proceeds. (Author abstract modified)

42491 **APTIC NO. 66430**

Hasegawa, Toshio

BAD ODOR SOURCES AND THE PRESENT STATE OF TREATMENT METHODS. *(Akushu no hasseigen to shori hoho no genjo). Text in Japanese. Preprint, Osaka Technical Assoc. (Japan) and Japan Burner Research Assoc., 21p., 1974. (Presented at the Seminar on Bad Odor Control Techniques, Osaka, Japan, Aug. 1, 1974, Paper 2.)*

The state of odor pollution was investigated at various odor sources including a melamine-alkid coating resin manufacturing plant, polyvinyl chloride processing plants, a synthetic leather manufacturing factory, an acryl adhesive manufacturing plant, a urea resin manufacturing plant, a carbon black manufacturing plant, melted zinc plating plants, sewage treatment plants, and refuse incinerators. The treatment methods are venturi scrubbers, packed towers (alkali), and ventilation and dispersion, but some plants had no control devices. The effects of odors were investigated by questionnaires in the vicinity of a zinc plating plant were complaints were frequently heard. Many of the complaints included bleeding nose and pains in the throat and larynx. Among the age group of 1-5, 53.8% had bleeding nose; ages 6-14, 71.9%; and older than 20, 53.3%. In the same area, 64.3% of ages 1-5, 47.1% of ages 6-14, and 53.8% of older persons than 20 had irritation of nasal mucous membranes. Hydrogen chloride and hydrogen fluoride both irritate various mucous membranes, but the symptoms are usually temporary. Zinc causes fever, respiratory membrane irritation, stomach membrane irritation, headaches, and in some extensive cases, diabetes.

42492 **APTIC NO. 66393**

Hausberg, Gerhard and Karl-Rudolf Hegemann

FLOW-ACCELERATING NOZZLE FOR GAS SCRUBBER. *(Gottfried Bischoff Bau Kompl Gosreinigungs und Wasseruckkuhlanlagen KG, Essen (West Germany)) U. S. Pat. 3,791,108. 5p., Feb. 12, 1974. 7 refs. (Appl. March 16, 1972, 6 claims).*

An improved nozzle construction for a copending spray tower scrubber is described which allows the exiting gas to be positively guided along part of its reversing flow to reduce turbulence and increase the operating efficiency of the tower. One or more of the flow-accelerating nozzles having pear-shaped inserts are vertically displaceable in a tubular housing to vary the width of an annular gap formed between the insert and the housing, allowing passage of the descending gas stream. The lower part of the housing is flared outwardly and provided with several spaced and similarly flared sleeves forming several annular exit channels around a central port accommodating a stem which supports the insert. (Author abstract modified)

42493 **APTIC NO. 66390**

Hayashi, Yoshimasa

SECONDARY AIR REGULATING SYSTEM FOR AUTOMOTIVE INTERNAL COMBUSTION ENGINE. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,791,146. 6p., Feb. 12, 1974. 5 refs. (Appl. April 27, 1972, 5 claims).*

A secondary air regulating system for supplying additional air to the exhaust system of an automobile for satifactory combustion of unburned exhaust contaminants is described which permits better adjustment of secondary air levels appropriate for various engine operation phases than prior art devices of similar type. The system has an air gallery leading from a pneumatic pump through a main passageway and communicating with the exhaust manifold of the engine through a secondary air inlet pipe opening into the exhaust manifold and a control valve assembly which is located in the main passageway to selectively discharge excess secondary air to the atmosphere for optimum oxidation of the engine exhausts. The control valve is responsive to the pressures prevailing in the air gallery and to the pressure of exhaust gases in the exhaust manifold, thus controlling the amount of secondary air leakage to the atmosphere. (Author abstract modified)

42494 **APTIC NO. 66124**

Hazard, H. R.

REDUCTION OF NOX BY EGR IN A COMPACT COMBUSTOR. *J. Eng. Power, 96(3):235-239, July 1974. 5 refs. (Presented at American Society of Mechanical Engineers, Gas Turbine Division, Annual Meeting, Winter, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/GT-3.)*

The effect of exhaust gas recirculation (EGR) on the emission of nitrogen oxides, carbon monoxide, and hydrocarbons from two compact, low emission burners sized for use in automotive Rankine cycle engines was investigated. One burner was a lean primary design, and the other was a rich primary design. Both had been developed to meet 1976 Federal Emission Standards for automobiles. There were significant reductions of NOx emission from both burners, with negligible effect upon emission of hydrocarbons and CO. The effect of EGR was additive to the effect of excess air, staged air admission, and wall cooling. The NOx emissions were below the emission goal of 1.4 g/kg with almost all points falling at or below 1 g/kg. The NOx level is dependent upon the percentage of EGR, decreasing as the percentage of EGR is increased. (Author abstract modified)

42495 **APTIC NO. 66583**

Hemeon, W. C. L.

PREVENTING EMISSIONS FROM SEWAGE SLUDGE DRYING -- A CASE HISTORY. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 165-173. (March 7-8.)*

Field test results are reported for attempts to control odorous and particulate emissions from a sewage sludge drying operation having stack gas rates up to 50,000 cfm. High energy scrubbing and aerosol filtration techniques were found inadequate, thus prompting experiments with incineration of the off-gases. An incinerator was installed on one of 14 drying units handling 34,000 scfm of hot gases containing odor and aerosol. Particulates were completely destroyed, and odor concentrations were reduced from a range of 8000-15,000 odor units/cu ft to 100 odor units/cu ft, with the residual odors being inoffensive in character. Important principles in the design of odor incinerators are summarized in terms of available heat in fuel, oxygen requirements, residence time, temperature, turbulence, and mixing.

42496 **APTIC NO. 66299**

Hodgson, J. N. and F. N. Collamore

TURBINE RANKINE CYCLE AUTOMOTIVE ENGINE DEVELOPMENT. *Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1974. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740298.)*

The potential of the Rankine cycle engine was evaluated as a low emission alternative to the internal combustion automotive engine. An organic fluid turbine engine was designed, fabricated, and tested. A steam turbine engine was prepared for vehicle road tests. Based upon fuel economy of 10 mi/gal, emissions less than 1/4 of the 1975-1976 federal standards were demonstrated. The low emissions were a direct result of the burner and vapor generator design. Performance equivalent to the internal combustion engine without exhaust emission controls appears feasible with further development. (Author abstract modified)

42497 **APTIC NO. 64763**

Holl, William H.

EXHAUST GAS RECIRCULATION SYSTEM. *(General Motors Corp., Detroit, Mich.) U. S. Pat. 3,785,151. 4p., Jan. 15, 1974. 3 refs. (Appl. Oct. 10, 1972, 2 claims).*

An exhaust gas recirculation system is described in which engine exhaust gases are recirculated to provide over-temperature protection to a catalytic converter in the exhaust system of the engine. The recirculation of a portion of the exhaust gases begin at a predetermined converter temperature. The amount of exhaust gases being recirculated increases with increases in converter temperature until all of the exhaust gases are recirculated back to the engine. In other systems, only a relatively small percentage of the exhaust gases are recycled, with a maximum limit up to about 25% of the total exhaust gases. (Author abstract modified)

42498 **APTIC NO. 66579**

Johnson, Charles A.

ELECTROLYTIC ODOR ABATEMENT PROCESS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 121-131. (March 7-8.)*

An electrolytic odor abatment process, known as the Carrier Regenerative Odor Destruction System (also known as the Carregen system), is described along with its application to a rendering plant. The Carregen system is a wet scrubbing process in which the oxidant is produced electrochemically, thus eliminating the need for continuous addition of chemicals. The electrochemical cell used in the system contains anodes and cathodes made of inert material, with oxidized metal ions reacting with reducing agents absorbed in the solution. The humectant properties of sulfuric acid are utilized to absorb water from the inlet airstream, making it unnecessary to continually add water which serves as the source of oxygen. Application of the system to a rendering plant indicates that the solution can be used for six months before replacement is necessary. Efficiency of odor removal is greater than 90%, with an operating cost of less than $2.00/hr.

42499 **APTIC NO. 66436**

Jones, R. C.

FUEL ADDITIVES. *Certificated Engr., 47(7):131-136, July 1974. (Presented at the Institution of Certificated Engineers, Durban Natal Branch, Nov. 1, 1973.)*

Fuel additives can be used to conserve fuel, to obtain maximum benefit from the heat value, and to reduce pollution. The cost of additives can be made up by the savings in boiler maintenance, increased fuel economy, reduction of pollution, and reduction in lost production due to boiler-house squeal. Since coal often does not have its desirable properties of high calorific value, low ash content, high ash fusion temperature, cleanliness, freedom from fines, and free burning, additives can be used to improve the coal. Additives can also control sulfur trioxide formation to reduce acid dew point (up to 50 F in known product). Additives can also be used to improve heavy residual fuel oil properties such as high calorific value, low ash content, high ash fusion temperature, cleanliness, predictable viscosity and flash point, low sulfur and vanadium content, and low sodium content. Additives can coat surfaces with a neutralizing film after removal of catalytic material to prevent further catalysis of SO3, dry out sticky deposits that exist and make them readily removable by normal methods by reducing SO3 and lowering the acid dewpoint, and have a large pore size to absorb gaseous pollutants in the flame area. Various additives for coal, heavy residual fuels, heavy furnace oil, diesel fuel oils, wood fuel, incinerators, and wood-fired boilers are discussed.

42500 **APTIC NO. 65762**

Jutze, George and Kenneth Axetell

INVESTIGATION OF FUGITIVE DUST VOLUME II-CONTROL STRATEGY AND REGULATORY APPROACH. *PEDCo Environmental Specialists, Inc., Cincinnati, Ohio, Protection Agency Contract 68-02-0044, Task 9, Program Element 412953BDD1 Rept. EPA-450/3-74-036-b. 33p., June 1974.*

NTIS: PB 233 256/AS

A study of alternative control strategies for controlling fugitive dust emissions in six air quality control regions is presented. The study was initiated to determine if, by using available technology, fugitive dust emissions can be controlled in AQCR s where fugitive dust emissions prevent the maintenance of the national ambient air quality standards for particulates. Fugitive dust emissions from the following sources were studied: unpaved roads, agriculture, construction, tailing piles, aggregate storage, and feed lots. The strategies were tested by IPP diffusion modeling and/or proportional modeling for each AQCR within the study area. The strategies include chemical stabilization and paving of roads, lowering of speed limits, continuous cropping or limited irrigation, watering, vegetative stabilization, and chemical spraying.

42501 **APTIC NO. 66573**

Jutze, George A.

ODOR CONTROL BY ADSORPTION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 39-48. 13 refs. (March 7-8.)*

The use of adsorption for odor control is discussed with particular emphasis on activated carbon. Adsorbents are characterized by a very large surface-to-volume ratio, ranging from 200 sq m/gm for aluminas to 1400 sq m/gm for some types of carbon. Behavioral aspects of activated carbon, aside from its adsorptive properties, include: catalytic action when the carbon bed is not sufficiently cool, rapid saturation from spills and vapor surges, and the ability to undergo special reactivation methods such as impregnation of the carbon with an oxidation catalyst. Operating cost estimates for typical activated carbon systems, operating with a solvent vapor concentration of 30-50% of the lower explosive limit, may be less than 5 cents/lb of solvent recovered and seldom more than 2 cents/lb. Case histories of activated carbon applications are cited for solvent recovery in rayon manufacture, the recovery of hydrogen chloride gas during the manufacture of chlorinated hydrocarbons, the collection of trichloroethylene vapors from degreasing plants, and the reclamation of industrial solvents from solvent-laden air.

42502 **APTIC NO. 66574**

Jutze, George A.

ODOR CONTROL BY ABSORPTION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 49-61. 9 refs. (March 7-8.)*

Odor control by absorption is reviewed in terms of system parameters, capital and operating costs, and case histories involving ammonia and amine emissions from a rendering operation, hydrogen sulfide emission from a sulfur dye manufacturer, and flue gas sulfur dioxide from a coal-fired boiler. Methods devised to maintain gas-liquid dispersal contact include: simple vertical spray towers in single or multiple stages; the cascade vertical tower; towers packed with partition rings, rashing rings, spiral rings, Berl saddles, hollow balls, and helical packing; centrifugal or cyclone scrubbers; and bubble and sieve trays. Gas-liquid feed configurations for achieving specific objectives include: countercurrent, cocurrent, and cross flow arrangements. Countercurrent absorbers have the advantages of high efficiency and economy as compared to cross flow absorbers, though the latter offer advantages which include lower liquid circulation rate, lower pressure drop as well as lower space requirements, and shorter ductwork. Comparisons of packing costs are given along with an expression for theoretical operating cost of a scrubber.

42503 **APTIC NO. 66426**

Kakatsios, Xenophon K.

DETERMINATION OF THE OPTIMUM SWIRL IN THE DESIGN OF HYDROCYCLONES. *(Bestimmung des optimalen Dralles bei der Auslegung von HYdrozyklonen). Text in German. Waerme, 80(4):90-92, 1974.*

Hydrocyclones are used for the centrifugal separation of gases or vapors from liquids. The gas/liquid mixture enters tangentially so that at the center of the axis of the separator a hollow space develops. The gases leave upward and the liquid falls to the bottom. It is important that an adequate swirl is imparted to the mixture at the entrance of the cyclone so that the gas bubbles are not destroyed, making a separation impossible. The optimum separation takes place at a certain angular and circumferential speed whose calculation is shown step-by-step.

42504 **APTIC NO. 66525**

Kalfadelis, C. D. and E. M. Magee

EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES; GASIFICATION; SECTION I: SYNTHANE PROCESS (FINAL REPORT). *Esso Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract 68-02-0629, Program Element 1AB013, Rept. EPA-650/2-74-009-b, ROAP 21ADD-23, GRU.4DJ.74, 93p., June 1974. 74 refs.*

The Bureau of Mines Synthane Coal Gasification Process was reviewed from the standpoint of its potential for affecting the environment. The quantities of solid, liquid, and gaseous effluents were estimated. The pollution potential was not completely defined in the context of U. S. standards even for those gasification processes which have already been commercialized elsewhere. Coal compositions, including sulfur and trace element contents, vary widely, even within particular regions or mines. Stream compositions from a particular process are generally sensitive to coal composition as well as to specific operating conditions. Synthane gasification approaches conditions which obtain in the commercialized Lurgi system, but the Lurgi gasifiers are fixed bed devices operating at less than half the pressure of the Synthane fluid-bed units. Process modifications or alternatives for the Synthane process are proposed and new technology needs are suggested. (Author summary modified)

42505 **APTIC NO. 66443**

Kant, F. H., R. P. Cahn, A. R. Cunningham, M. H. Farmer, W. Herbst, and E. H. Manny

FEASIBILITY STUDY OF ALTERNATIVE FUELS FOR AUTOMOTIVE TRANSPORTATION. VOLUME III - APPENDICES. *Exxon Research and Engineering Co., Linden, N. J., Office of Air and Waste Management Contract 68-01-2112, Rept. EPA-460/3-74-009-c, 141p., June 1974. 35 refs.*

NTIS: PB 235583/AS

Appendices are provided under separate cover for a feasibility study on alternative automotive fuels from coal and oil shale. Supplementary material is presented on background considerations, transportation fuel demand, resource base information, possible approaches of other countries to alternative transportation fuels, build-up of synthetic fuels manufacturing capacity, the significance of fuel properties, bases for capital recovery, refining of shale and coal syncrude, coal mining costs and investments, and the cost of operating an automobile.

42506 **APTIC NO. 64682**

Kimura, Gakuyu

INVESTIGATION OF HYDROCARBON EVAPORATION PREVENTION MEASURES IN KANAGAWA PREFECTURE. *(Kanagawakenka ni okeru tanka suisokei busshitsu no johatsu boshi ni kansuru chosa ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 10(6):44-54, June 1974.*

Questionnaires concerning the handling of fuel were distributed to 9096 factories, 800 gas stations, and 904 dry cleaners. The most commonly consumed hydrocarbons are heavy oil, kerosene, and gasoline. Heavy oil was mostly stored in tanks and kerosene in drums. Except for those for large quantities of heavy oil and gasoline, most of the containers were between 1 and 49 kl in volume. Approximately half of the storage facilities for large quantities of hydrocarbons were underground. Only 20% of the facilities had suitable means for the prevention of evaporation of the hydrocarbons, (30% in chemical industries). Measures for prevention include cooling and condensation liquid absorption, water spraying, and combustion.

42507 **APTIC NO. 64787**

Kita, Kenosuke

A SMOKE PREVENTION DEVICE. *(Boen sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 49-18954. 2p., May 14, 1974. (Appl. July 17, 1970, 1 claim).*

This device is designed for the treatment of exhaust gas from boilers using coal, heavy oil and coke as fuels. The colored exhaust gas, so-called smoke, containing colloidal particles and toxic combustible residual gases is burned midway along the smoke stack, converting colloidal carbon and carbon monoxide into carbon dioxide before emission into the atmosphere. To achieve this purpose, a fuel injection nozzle is installed midway along the smoke stack, and smokeless fuels such as alcohols and hydrocarbons with carbon number one to four are injected into the smoke stack and ignited to flame. The exhaust gas passing through the flame area is detoxified by the oxidation reaction.

42508 **APTIC NO. 64762**

Kolody, Dale A.

ENGINE SPARK CONTROL AND EXHAUST GAS RECIRCULATION VACUUM SIGNAL SELECTOR. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,783,847. 6p., Jan. 8, 1974. 7 refs. (Appl. Dec. 6, 1972, 17 claims).*

An engine emission control system is described which includes exhaust gas recirculating (EGR) and engine spark timing devices. Each normally is connected respectively to axially spaced EGR and spark ports in the carburetor induction passage above the closed position of the throttle valve. Valving is provided under the control of temperature changes and changes in the operation of the vehicle transmission. The connections can be switched to the exhaust recirculating device from EGR port to spark port operation and vice versa. Emissions are improved while maintaining a constant vehicle drive quality, or vehicle drive quality is improved while maintaining a constant emission level. The ability to maintain vehicle drive quality while using EGR is an improvement over other systems. (Author abstract modified)

42509 **APTIC NO. 66164**

Kontani, Kazuo, Naohisa Teshirogi, Sadaichi Ozaki, Yoshitada Uchiyama, and Kin-ichi Motohashi

EFFECTS OF EGR IN A SWIRL CHAMBER TYPE DIESEL ENGINE. *(Uzushitsu shiki dizeru kikan ni okeru EGR no koka). Text in Japanese. Kikai Gijutsu Kenkyusho Shoho (J. Mech. Eng. Lab.), 28(4):105-120, July 1974. 8 refs.*

The effects of exhaust gas recirculation (EGR) in a swirl chamber type diesel engine were investigated to establish the relation between diesel combustion and exhaust emission. Nitrogen oxide emissions from a diesel engine can be reduced by EGR, water injection, and retardation of fuel injection timing. The experimental data on the effects of EGR are presented including the results of the retardation of fuel injection timing used with EGR. A comparative study of the intake charge dilution by non-active gases of carbon dioxide and nitrogen is reported.

42510 **APTIC NO. 66268**

Krill, Helmut and Hans Wirth

GAS PURIFICATION WITH CHARCOAL-BASED PURIFYING MATERIALS. *(Gasreinigung mit Reinigungsmassen auf Kohlebasis). Text in German. Chem.-Ing.-Tech., 46(18):757-762, 1974.*

Adsorption on activated charcoal possesses industrial interest primarily in solvent recovery, gas separation, gas purification, and recently to a greater extent in reducing atmospheric pollution. Apart from pure adsorption, capillary condensation is frequently also considerable and accounts for the high adsorptive power of activated charcoal. Impregnation sometimes also assists the separation of small amounts of substances; it can act both by way of a purely chemical reaction and in some cases by means of catalytic properties. Several industrial processes are considered; the Supersorbon process for solvent recovery, the Sulfosorbon process for purification of exhaust air from a viscose plant, and the Sulfreen process for purification of residual gases from a Claus plant.

42511 **APTIC NO. 66372**

Kutyna, A. G., R. O. Blosser, W. J. Gillespie, and G. Gove

COMBINATION FUEL-BOILER PARTICULATE EMISSION CONTROL PILOT STUDIES. *TAPPI, 57(9):139-143, Sept. 1974. (Presented at the Technical Association of the Pulp and Paper Industry, Environmental Conference, New Orleans, La., April 16-19, 1974.)*

The performance of two different types of dust collectors was studied on boilers firing bark in combination with coal, oil, or gas. One collector, a Swedish product, was of the cellular multicyclone type, while the other was a conventional variable orifice venturi scrubber. Tests on the venturi scrubber were conducted at pressure drops ranging between 10 and 25 in. w.g. The pressure drop across the dry collector was maintained between 3 and 5 in. w.g. depending upon the fuel combinations burned. Tests performed on the multicyclone indicated that the unit is capable of maintaining a given pressure drop (and hence a given efficiency) even though the gas throughput may be reduced by as much as one-third of its design value. In addition, the emissions from this unit, while dependent upon the fuel types burned, were better than 0.2 grain/standard cu ft in almost all cases. The collection efficiency of the venturi scrubber was a function of the pressure drop across the venturi throat. The emissions produced during gas and bark combination operations were so small that valid conclusions could not be drawn based on the data collected on this fuel combination. (Author abstract modified)

42512 **APTIC NO. 66373**

Lang, Robert J.

REACTOR ASSEMBLY TO REDUCE AUTOMOTIVE EMISSIONS FROM AN INTERNAL COMBUSTION ENGINE. *(Esso Research and Development Co., Linden, N. J.) U. S. Pat. 3,791,144. 13p., Feb. 12, 1974. 14 refs. (Appl. March 31, 1972, 23 claims).*

A flame reactor assembly for the reduction of automotive internal combustion engine emissions is described. The exhaust gases are mixed with air for oxidation of carbon monoxide and hydrocarbons in the area adjacent the exhaust ports during start-up, while CO and hydrocarbon oxidation occurs in the reactor when normal operating temperatures are reached. Flameholders are utilized in each exhaust port of the engine to speed warm-up and lower emissions. A further refinement is the recycle of cooled exhaust gases under certain operating conditions. The reactor is preferably of the annular or circular combustion chamber type, with exhaust inlet means disposed to tangentially introduce the exhaust gases into the combustion chamber and with exhaust outlet means positioned and proportioned relative to the inlet means so that the exhaust gases leaving the reactor through the outlet means are completely combusted. Another refinement is the utilization of a nitrogen oxides reducing catalyst located upstream of the reactor for reducing the NOx level in the exhaust gases prior to combustion in the reactor. (Author abstract modified)

42513 **APTIC NO. 64589**

Laprade, Bernard, Xavier Laprade, and Pierre Gele

AN IMPROVED CARBURATION SYSTEM FOR MULTICYLINDER INTERNAL COMBUSTION ENGINES. *(Assignee not given.) Brit. Pat. 1,353,231. 6p., May 15, 1974. (Appl. Aug. 11, 1971, 13 claims).*

An improved carburetion system for a multicylinder internal combustion system is described comprising a chamber having an air inlet in which is located an auxiliary throttle member, a fuel metering system controlled by the auxiliary throttle member, a main throttle means located downstream of the auxiliary throttle member, and, for each cylinder of the engine an air intake pipe extending from an inlet distribution element of the respective cylinder to the chamber and a fuel pipe for introducing fuel from the metering system into the intake pipe near the distribution element, the discharge end of the fuel pipe being located at a point at which the pressure is substantially the same as the pressure existing between the auxiliary throttle member and the main throttle means. A disadvantage of the known carburetion unit is that a complete carburetion unit comprising the main throttle member and fuel-metering system must be provided for each cylinder, so that assembly is costly and complex.

42514 **APTIC NO. 66577**

Lauren, Oscar B. and Stephen E. Elinsky

ODOR MODIFICATION AND MASKING. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 88-97. 12 refs. (March 7-8.)*

The principles of odor modification and masking are discussed, with case histories being cited for the application of odor modification to a soya oil production facility with unspecified malodors of the fatty, glue-like, rendering type and to an adhesive and rubber products facility emitting vapors of aromatic hydrocarbons, amines, acrylics, and other constituents. Application of odor modification agents is discussed in terms of direct addition, spraying, metered feeding, and the use of dispensers, as well as in terms of the relative economics of a given application method for a given type of problem. Odor characteristics and odor threshold recognition levels are given for hydrogen sulfide, ethyl mercaptan, and pyridine and are compared to the threshold limit values representing the danger levels of these gases.

42515 **APTIC NO. 66398**

Leder, Frederic

PROMOTION FOR GAS ABSORPTION. *(Esso Research and Engineering Co.) U. S. Pat. 3,793,434. 5p., Feb. 19, 1974. 4 refs. (Appl. Oct. 1, 1971, 24 claims).*

A modification to the use of potash or other alkali metal salts for the absorption of acid gases such as carbon dioxide, hydrogen sulfide, sulfur dioxide, and carbonyl sulfide is presented in which amines such as piperidine, 1-6-hexanediamine, and their derivatives are added to the alkali metal salt solutions, resulting in the formation of a solution with a much improved ability over existing technology to remove acid gases from gas mixtures. The amines are capable of forming regions of liquid- liquid-gas immiscibility in the process solution, though the mixture is maintained in a single phase during the absorption of the gases. The single phase is maintained by keeping the acid gas above about 25% of the solution s total capacity for the gas.

42516 **APTIC NO. 66139**

Lloyd, S. A. and F. J. Weinberg

A BURNER FOR MIXTURES OF VERY LOW HEAT CONTENT. *Nature (London), 251(5470):47-49, Sept. 6, 1974. 8 refs.*

Increased fuel demand may lead to burning of low grade fuels or air/fuel mixtures which may not be formally flammable. When various waste and exhaust gases are emitted unburned, some undesirable pollutants are added to the atmosphere and energy is wasted. Such gases can be burned as a low grade fuel source. A burner was developed for burning low grade fuels using heat from the burner to preheat gases without simultaneous dilution of reactant by-products. It gives beneficial effects on limiting burning rates and compositions, on pollutant emission, on fuel saving, and on the efficiency of conversion to electrical power when the unconverted energy is incorporated in the heat recycle. Laboratory feasibility tests were conducted with combustion chambers. Such burners could be used to burn undesirable pollutants, with fluidized beds, and for direct power generation. The feasibility of using a device burning lean fuel/air mixtures well below the conventional flammability limit for direct power generation was tested.

42517 **APTIC NO. 66526**

Locklin, D. W., H. H. Krause, A. A. Putnam, E. L. Kropp, W. T. Reid, and M. A. Duffy

DESIGN TRENDS AND OPERATING PROBLEMS IN COMBUSTION MODIFICATION OF INDUSTRIAL BOILERS (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Grant R-802402, Program Element 1AB014, Rept. EPA-650/2-74-032, ROAP 21ADG-83, 187p., April 1974. 85 refs.*

NTIS: PB-235 712/AS

Design trends and operating problems in the modification of combustion in industrial boilers were investigated. Practical operating problems which occur when combustion modifications are used to control nitrogen oxides include: fireside corrosion and deposits on boiler tubes, flame instability as blowoff, flash back, combustion driven oscillation, and combustion noise. Research needs are identified in relation to low-excess air operation, staged combustion modification, and flue gas recirculation. Field population and recent sales trends are described for firetube and watertube industrial boilers in the range from 10 million to 500 million Btu/hr. Aspects considered were boiler capacity, design type, mode of erection, primary and secondary fuels, firing method for coal, and industrial classification and geographic region of the boiler installation. (Author abstract modified)

42518 **APTIC NO. 66578**

Lovett, William D. and Raymond L. Poltorak

THE USE OF ACTIVATED CARBON FOR CONTROLLING ODOROUS AIR POLLUTANTS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 98-120. 13 refs. (March 7-8.)*

A review of the use of activated carbon for controlling odorous air pollutants is presented. Applications are emphasized where activated carbon is used as part of a total odor control system for low concentration/high volume odor emissions, as well as those systems for controlling odorous vapors emanating from storage tanks, reactor vessels, or other sources where small volumes of odorous gases are involved. Applications cited include: sewage treatment, rendering, foundry odors, paint bake ovens, and polyester producing operations. The vent sorb system, a prefabricated miniature granular activated carbon filter containing all the essentials for a full scale carbon system, is discussed in relation to the removal of small volume odorous gases such as hydrogen sulfide, mercaptans, sulfur dioxide, amines, ammonia, oil vapors, halogens, hydrocarbons, solvents, aldehydes, monomers, organic decomposition products, and chlorinated hydrocarbons.

42519 **APTIC NO. 66194**

Lucas, H. G. and N. S. Smith, Jr.

MULTIPLE-ORIFICE FEEDER FOR FINE PARTICLES. *Bureau of Mines, Morgantown, W. Va., Morgantown Energy Research Center, RI 7944, 6p., 1974. 4 refs.*

A modified screw-type device that will feed fine fly ash, coal dust, and other particulates of varying size distributions over considerable ranges of flow without excessive agglomeration or flocculation was developed for testing or calibration of dust control devices. The feeder screw is supplied at constant pressure by a hopper orifice arrangement to feed solids in ranges up to several hundred micrometers at constant flow rates. Performance of the feeder was evaluated by measuring the flow rates obtained with 3-7 micron coal ash, 70% through 200 mesh coal, and minus 325 plus 400 mesh coal ash. Constant feed rates within a few percent of set values were achieved for half-hour periods for the larger particles and for 5-minute periods for the finer particles. Suggestions are given for feedstock preparation and feeder operation for optimum performance. (Author abstract modified)

42520 **APTIC NO. 66539**

Marier, P. and H. P. Dibbs

THE CATALYTIC CONVERSION OF SO2 TO SO3 BY FLY ASH AND THE CAPTURE OF SO2 AND SO3 BY CAO AND MGO. *Thermochimica Acta, vol. 8:155-165, 1974. 21 refs. (Presented at the North American Thermal Analysis Society Meeting, 4th, Worcester, Mass., June 13-15, 1973.)*

Laboratory studies are performed on the catalytic conversion of sulfur dioxide to sulfur trioxide by fly ash and the capture of SO2 and SO3 by calcium oxide and magnesium oxide. The catalytic conversion of SO2 to SO3 by fly ash is dependent on the iron oxide content of the ash and is essentially linear from 7-25% Fe2O3; SO2 oxidation is significantly reduced by the presence of carbon in the fly ash. The optimum temperature for the production of SO3, formed under dynamic conditions in the presence of carbon-free fly ash, or Fe2O3, is between 700-750 C. Increasing the gas-solid contact time and decreasing the ratio of SO2 to oxygen favors the production of SO3 and the best utilization of CaO and MgO. The homogeneous mixing of the oxidation catalyst (Fe2O3) with the scavengers (CaO and MgO) and the availability of large surface areas optimize the desulfurization of the flowing gas and the utilization of the scavengers. The efficient capture of SO2 from a hot gas stream by CaO and MgO is directly related to the catalytic conversion of SO2 to SO3 in an oxidizing atmosphere. (Author conclusions modified)

42521 **APTIC NO. 66350**

Martin, G. Blair

ENVIRONMENTAL CONSIDERATIONS IN THE USE OF ALTERNATE CLEAN FUELS IN STATIONARY COMBUSTION PROCESSES. *Preprint, Environmental Protection Agency, Washington, D. C., Control Systems Lab., 24p., 1974 (?). 25 refs.*

Environmental considerations in the use of alternate clean fuels in stationary combustion processes are described. Fuel conversion processes produces sulfur-free fuels for a variety of end uses and simultaneously remove ash. This reduces or eliminates two major pollutants normally produced in direct coal combustion. The pollutants which remain are nitrogen oxides, carbon monoxide, unburned hydrocarbons, particulate carbon, and trace metals. Combustion modification has good potential for control of NOx for alternate fuels which are not inherently low NOx emitters. Proper system design, based on combustion characteristics of the fuels, should eliminate products of incomplete combustion. Trace metals emissions will depend primarily on the characteristic of the fuel and control will depend on removal at the fuel production site or from the flue gas. Emission characteristics of the following alternate fuels are discussed: synthetic natural gas, medium Btu gas, low Btu gas, synthetic oil, alcohol fuels, and combined fuels. (Author summary modified)

42522 **APTIC NO. 66158**

Masaki, Kenji and Hiroyuki Maruoka

CARBURETOR CONTROL MECHANISM FOR AN AUTOMOTIVE GASOLINE POWERED INTERNAL COMBUSTION ENGINE. *(Nissan Motor Co., Ltd., Yokohama City (Japan)) U. S. Pat. 3,791,358. 6p., Feb. 12, 1974. 6 refs. (Appl. Nov. 21, 1972, 4 claims).*

A carburetor control mechanism for minimizing the noxious components in automotive internal combustion engine emissions during the warm-up period is described which provides an automatic choke and throttle control for promoting the rate of engine temperature increase. The control mechanism consists of a first vacuum responsive actuator which is responsive to intake manifold vacuum and which automatically opens a carburetor throttle valve during warm-up, a solenoid valve for providing communication between the first vacuum responsive actuator and the intake manifold, an electric control device for controlling the solenoid valve and for retarding the ignition timing of the engine during warm-up, a second vacuum responsive actuator which is responsive to intake manifold vacuum and which automatically opens a choke valve, and a thermostat controlled device for controlling the level of vacuum acting on the second vacuum responsive actuator in accordance with the engine temperature. (Author abstract modified)

42523 **APTIC NO. 66576**

McIlwee, Roy J.

CATALYSIS IN AIR POLLUTION CONTROL. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol. Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 80-87. (March 7-8.)*

Fundamental techniques involved in applying catalytic combustion to the control of certain types of industrial odors are reviewed. Oxidation catalysts used for air pollution control are of the surface type, with the oxidation or burning occurring at the surface of the solid where the combustibles and the oxygen come into contact with the catalytic agent. Three principles used in the design of a catalyst system are: lower residence times are required for catalytic units than for thermal incineration; less energy is required to run a catalytic unit than a thermal unit; and catalysis is a surface phenomenon. Operating temperatures for catalysts range from 500-850 F for solvent type emissions, including ketones and alcohols, encountered in painting, printing, textile drying, and metal-coating operations. Typical operating temperatures for catalysts handling vaporized animal and vegetable oils from food processing operations are from 500-700 F, while catalytic operating temperatures for chemical processing exhausts vary between 400-750 F in general. Catalytic poisoning is not nearly as significant as is sometimes stated, and simple tests using a pilot unit or a test cartridge will adequately determine the proper course of action if poisoning is a consideration.

42524 **APTIC NO. 66093**

Meenan, Cyril F.

FURNACE EXHAUST TREATMENT SYSTEM. *(Meenan Corp., Skokie, Ill.) U. S. Pat. 3,794,459. 8p., Feb. 26, 1974. 7 refs. (Appl. Nov. 29, 1972, 14 claims).*

An afterburner recycling system for virtually eliminating combustion pollutants from hot air furnaces is described which returns the contaminant free air back into the furnace, taking advantage of the recovered heat and increasing the efficiency of the furnace. The process includes transporting the contaminated air to a second furnace, providing in addition to the contaminated air, primary and secondary air to the second furnace. The contaminated air is burned for a sufficient period of time to produce substantially contaminant free air which is mixed with outside air and transported back to the first furnace and to the atmosphere. The combustion chamber of the second furnace has a fuel discharge nozzle disposed at one end of the chamber which is adapted to produce a flame by igniting a fluid fuel discharged under pressure through the nozzle. A conduit disposed in the chamber at positions along the length thereof carries the contaminated air in the chamber. (Author abstract modified)

42525 **APTIC NO. 66554**

Meissner, Roland E., III

CONTROL OF SULFUR EMISSIONS FROM SOLID FUEL CONVERSION PLANTS. *Preprint, American Inst. of Chemical Engineers, 20p., 1974. 39 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 76th, Tulsa, Okla., March 10-13, 1974.)*

The use of modified petroleum processing technology for treating effluent streams is applied to the control of sulfur emissions from solid fuel conversion plants. The types of plants considered are those to convert coal to high Btu fuel gas and those to extract oil from shale. The origin of sulfur bearing aqueous and gaseous effluent streams and their treatment in a petroleum refinery are reviewed. The origin of effluent streams from two types of solid fuel conversion plants is outlined. The use of modified conventional refinery technology to treat these effluent streams is discussed.

42526 **APTIC NO. 66132**

Merrill, John J.

GAS DESULFURIZATION. *(Chevron Research Co., San Francisco, Calif.) U. S. Pat. 3,794,710. 4p., Feb. 26, 1974. 3 refs. (Appl. Sept. 17, 1971, 6 claims).*

A process for the removal of sulfur compounds from sulfur plant tail gases consisting of sulfur dioxide, carbonyl sulfide, carbon disulfide, entrained and vaporized sulfur, and hydrogen sulfide is presented as an alternative to prior art methods which are either more expensive or complicated than the present method or offer less complete removal of the above compounds. The process involves oxidizing the tail gas stream for the conversion of the sulfur- containing gases to SO2 and carbon dioxide. The oxidized gas stream is then fed to a hydrogenating zone where it is contacted with a hydrogenation catalyst at a temperature between 400 and 900 F in the presence of hydrogen gas to obtain a hydrogenated gas stream consisting of H2S and CO2. The H2S is then scrubbed from the hydrogenated gas stream to obtain a purified stream. It is particularly preferred to maintain at least 0.4 mole of water in the oxidized gas stream fed to the hydrogenation zone per mole of oxidized gas stream in order to maintain the COS concentration in the effluent from the hydrogenation zone at a very low part per million level. (Author abstract modified)

42527 **APTIC NO. 62588**

Miyajima, Masasato

NOX CONTROL MEASURES FOR ELECTRIC POWER INDUSTRIES. *(Denryokugyo ni okeru NOx taisaku). Text in Japanese. Preprint, Japan Management Assoc., p. 19-30, June 1974. 1 ref. (Presented at the Japan Management Association National Conference of Pollution Control Techniques, Tokyo, Japan, June 10-14, 1974, Paper 9.)*

The nitrogen oxides emission from power plants vary greatly depending on the type of boiler, fuel, and output capacity.

Taking 120 representative boilers, the data on NOx emission were compiled according to the type of fuel and output capacity, indicating that the fuel type was the major factor affecting NOx concentration ranging from 647 ppm of coal boiler to 298 ppm of heavy oil and crude oil boilers. The existing boiler with technologically possible improvements leaves little room for further improvement. By combining a boiler designed for pollution control with the use of heavy oil or natural gas as a fuel, the NOx concentration can be reduced to below 100 ppm or 50 ppm, respectively. The reduction rates of NOx emission by improved combustion methods are recirculation of exhaust gas 30%, two-step combustion 17-27%, and low excess air combustion 49%. The use of low NOx burner combined with other control measure further increases the reduction rate. The removal process of NOx from exhaust gas is still being developed. The dry ammonia reduction method using ammonia as reducing agent and the wet method are the two major procedures under development.

42528 **APTIC NO. 66330**

Munakata, Tsuyoshi, Yoshiteru Seki, Masahiko Mine, and Nobuyuki Hirai

EXPERIMENTAL STUDY OF THE CHARACTERISTICS OF CYCLONE SEPARATORS UNDER VACUUM OPERATION. *(Saikuron shujinki no shinku sosa ni okeru tokusei ni kansuru jikkenteki kenkyu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 38(9):675-681, Sept. 1974. 6 refs.*

The pressure drop and dust separation mechanism were investigated under vacuum conditions in three geometrically similar cyclones. In the dust collection experiment, if the Reynolds number is as low as 100, the centrifugal force shows little separating power. In the experiment on pressure drop, the cyclone friction loss expressed as number of inlet velocity heads, F, holds nearly constant when the inlet Reynolds number (Rei) is greater than 1000. Fluid does not swirl in a cyclone when Rei is less than 100.

42529 **APTIC NO. 66197**

Murphy, J. E., F. P. Haver, and M. M. Wong

RECOVERY OF LEAD FROM GALENA BY A LEACH ELECTROLYSIS PROCEDURE. *Bureau of Mines, Reno, Nev., Reno Metallurgy Research Center, RI 7913, 9p., 1974. 4 refs.*

A leach electrolysis procedure for the recovery of lead from galena without the generation of sulfur dioxide is described. Lead chloride is obtained by leaching Pb concentration at a temperature of approximately 100 C with iron chloride ($FeCl_3$) solution. Electrolysis of the $PbCl_2$ product in a fused salt bath results in deposition of molten Pb metal at the cathode and evolution of chlorine at the anode. The Cl_2 can be absorbed in the spent leach solution to regenerate $FeCl_3$ for recycling. Optimum electrolyte composition was a $PbCl_2$-lithium chloride eutectic containing 7.6 wt% LiCl. The $PbCl_2$-sodium chloride eutectic was also satisfactory. Electrolysis in the $PbCl_2$-LiCl bath at 450 C yielded 99% current efficiency at a current density of 5 amp/sq in with an energy requirement of only 0.24 kW-hr/lb metal produced. This compared with 98% current efficiency and 0.26 kW-hr/lb metal produced for the $PbCl_2$-NaCl bath. A typical Pb deposit contained less than 100 ppm total detectable metallic impurities. At the low temperature employed for electrolysis, there was essentially no vaporization of Pb or $PbCl_2$. (Author abstract modified)

42530 **APTIC NO. 66401**

Musick, James K. and Frederick W. Williams

CATALYTIC DECOMPOSITION OF HALOGENATED HYDROCARBONS OVER HOPCALITE CATALYST. *Ind. Eng. Chem., Prod. Res. Develop., 13(3):175-179, Sept. 1974. 10 refs.*

Nineteen halogenated hydrocarbons mixed with air were exposed to hopcalite catalyst in a laboratory-scale catalytic burner under operating conditions used in submarine burners. In addition to testing at the typical submarine burner temperatures of 305 and 315 C, most of the 19 compounds were also tested at 360 and 415 C. Degree of decomposition was measured by analyzing the burner influent and effluent for the halogenated hydrocarbons by gas chromatography. To estimate the amount of decomposition products (free halogens, halogen acids, and phosgene) of the hydrocarbons, detector tubes and detector paper were used. These detector devices revealed slight degrees of decomposition not detectable by the gas chromatograph. The 19 compounds were arbitrarily classified into two groups: a group of seven on which no decomposition at 305 or 315 C was detectable by gas chromatography, and a group of 12 in which the degree of decomposition at 305 or 315 C (L.5-100%) was measurable by gas chromatography. The catalytic combustion of halogenated hydrocarbons is a possible control method for these substances, but it may produce corrosive decomposition products which could harm the control equipment. (Author abstract modified)

42531 **APTIC NO. 61346**

Nagata, K., M. Yamazaki, and K. Yamazaki

EFFECT OF FUEL-AIR MIXING ON THERMAL NOX FORMATION. *(Thermal NOx seisei no oyobosu nenryoshitsunai kingo tokusei no eikyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 53(562):18-188, March 1974. 7 refs.*

The effect of fuel-air mixing in the combustion chamber was evaluated using the small-scale propane-firing combustor which is similar to the actual precombustion chamber-type furnace. The mixing pattern in the combustion chamber was changed mainly by the variation of the velocity of fuel jet according to adjusting the width of nozzle slit of burner. The formation of nitrogen oxides is greatly influenced by fuel air mixing patterns in the combustion chamber. At certain mixing conditions, NOx formation reaches to the maximum level. In bad mixing conditions, heat release from the combustion zone increases and combustion temperature decreases, resulting in NOx reduction. In the good conditions, decreasing residence time and oxygen concentration reduction in the high temperature region due to short flame zone causes low NOx level. The momemtum ratio of fuel jet and air stream is considered to be the identifying factor of mixing pattern in the combustion chamber, and can be introduced to determine the qualitative relation between NOx formation and mixing pattern. Maximum NOx formation level appeared at certain volume ratio of fuel and air in the actual combustion zone, and this fuel air ratio is the important factor to dominating the overall NOx formation level.

42532 **APTIC NO. 62760**

Negras, John Samuel and Abe Warshaw

PROCESS FOR TREATING COMBUSTION EXHAUST GAS. *(Chemical Construction Corp., New York) Brit. Pat. 1,346,853. 4p., Feb. 13, 1974. (Appl. May 25, 1971, 7 claims).*

A catalytic process for the purification of exhaust gas from internal combustion engines to remove deleterious components is described. The catalyst contains small but catalytically effective amount of a synergistic combination of nickel (6-12% by weight), cobalt (1-5% by weight), and manganese (0.5-3% by weight) supported on carrier material. The process is highly effective in reducing nitrogen oxides to nitrogen, and to oxidize carbon monoxide and vaporous hydrocarbons to carbon dioxide and water vapor.

42533 **APTIC NO. 66561**

Nelson, P. A. and D. S. Webster

HIGH-ENERGY BATTERY PROGRAM AT ARGONNE NATIONAL LABORATORY. *Argonne National Lab., Argonne, Ill., Chemical Engineering Div., Atomic Energy*

Commission Contract W-31-109-Eng-38, Rept. ANL-8064, 25p., April 1974. 20 refs.
NTIS: ANL-8064

Experimental findings are described for the development of electrically rechargeable lithium/sulfur batteries for use as energy-storage devices for electric utility networks and as power sources for electric automobiles. High temperature cells having negative electrodes of a lithium-aluminum alloy, and a molten- salt electrolyte of lithium chloride and potassium chloride, and positive electrodes of iron sulfide show promise of meeting the requirements of both applications. A maximum specific energy of 121 W-hr/kg is demonstrated during testing with full-scale cells (13 cm diameter), with a specific energy of 65-100 W-hr/kg being obtained in 41 cycles over a period of 1390 hr. Studies with small scale cells having FeS electrodes indicate that FeS is also a promising electrode material. Although Li-Al negative electrodes are less corrosive toward ceramic cell components than molten lithium electrodes, studies of the latter are being continued because of the higher specific energy theoretically attainable with molten lithium. (Author abstract modified)

42534 **APTIC NO. 66256**

Nitadori, Jiro, Haruji Kobayashi, Kiyoshi Koseki, and Kozo Sakurai

REMOVAL OF SULFUR DIOXIDE FROM FLUE GAS USING BLAST FURNACE SLAG. *(Koro suragu o riyo suru haien datsuryu ni kansuru yosatsu jikken). Text in Japanese. Kogai Shigen Kenkyusho Iho (Bull. Pollut. Resour. Res. Inst.), 3(37):1-6, March 1974. 3 ref.*

The removal of sulfur dioxide in simulated flue gas containing SO2 of concentration 3660 and 3880 ppm was investigated. The simulated gas was passed through a suspension of a mixture of water and the fine powder of blast furnace slag. The concentration of SO2 in the desulfurized gas was kept less than 100 ppm and more than 90% of the SO2 in the original simulated gas was removed. Most of the sulfur compounds were found after desulfurization in the form of sulfite.

42535 **APTIC NO. 66225**

Norro, Allen Ferdinand

METHOD FOR PREVENTING THE DILUTION OF SULPHUR DIOXIDE CONTAINING WASTE GASES OBTAINED IN COPPER CONCENTRATE ELECTRIC SMELTING FURNACES. *(Boliden Aktiebolag, Stockholm (Sweden)) U. S. Pat. 3,792,998. 4p., Feb. 19, 1974. (Appl. Feb. 24, 1972, 1 claim).*

A method for preventing the dilution of sulfur dioxide containing waste gases obtained in copper concentrate electric smelting furnaces is described. The removed sulfur dioxide containing waste gases are cleansed to remove entrained solid particles from the gases, whereafter a portion of the cleansed gas is cooled and injected into the furnace in a manner such that it passes around the cylindrical surface of the electrode to cool the same, while air is prevented from entering the furnace through the electrode lead-in. Thus, the electrode and the portion of the furnace in the vicinity of the electrode lead-in are held at suitable temperatures, while the cooled SO2 gas reintroduced into the furnace chamber tends to increase at least slightly the content of SO2 in the waste gases successively withdrawn from the furnace. Since cooling of the electrode is effected in the absence of air, the gas is no longer diluted in the manner obtained with present day systems.

42536 **APTIC NO. 62365**

Omori, Katsumi

DISPOSAL BY INCINERATION OF ORGANIC ODORS. *(Yukisho no shokyaku shorin ni tsuite). Text in Japanese. Nenryo oyobi Nensho (Fuel and Combustion), 41(4):332-336, April 1974.*

The 13 odors subject to control under the Odor Control Law include methyl mercaptan, ethyl mercaptan, dimethyl sulfide, diethyl sulfide, hydrogen sulfide, methyl amine, ethyl amine, trimethyl amine, ammonia, butylene, butyric acid, acetone, and acrolein. There are generally three methods of odor control currently in use: destructive methods such as deodorization by combustion or oxidation by ozone or chlorine; adsorptive methods using active carbon an ion exchange resins; and absorptive methods using an organic solvent, acid, or alkali. The firint point is at a temperature ranging between 120 and 720 C for most odors, which can therefore be decomposed instantaneously by combustion at 700-800 C with the presence of sufficient oxygen. However, their concentrations in the emission gases are so low that various considerations are required for satisfactory combustion or oxidation. The fundamental requirements for an odor combustion device to achieve complete combustion or decompositon of pollutants include: a reaction temperature appropriate for the firing point and properties of the pollutant, complete oxidation within 0.3-0.5 sec, oxygen available for the combustion be 18% or more, gas flow rates of 10-15 m/sec. for contact with the combustion flames, and a concentration of the odorous gas below the lowest limit point of explosion. The combustion furnace is usually tubular. The tubular furnace designed to give longer and larger flames during combustion is advantageous for effective combustion. The gas containing incombustible substances requires pre- or post- treatment such as drying or removal of heavy metals, inorganic and rocks. There are also devices to recover the combustion heat.

42537 **APTIC NO. 66138**

Potter, Edmund C. and Colin A. J. Paulson

IMPROVEMENT OF ELECTROSTATIC PRECIPITATOR PERFORMANCE BY CARRIER-GAS ADDITIVES AND ITS GRAPHICAL ASESSMENT USING AN EXTENDED DEUTSCH EQUATION. *Chem. Ind. (London), 2(13): 532-533, July 1974. 1 ref.*

An extended Deutsch equation is based to graphically assess the effect of various carrier-gas additives on the performance of electrostatic precipitation of fly-ash. Collection efficiencies at 120 C are plotted against a combined function of precipitator size and operating kilovoltage for cyclohexylamine, sulfur trioxide, ammonia, and triethylamine. The beneficial effect of the familiar additive SO3 results from higher attainable voltages made possible. Triethylamine effectively increases particle size by agglomeration of suspended dust in contrast to cyclohexylamine which breaks up agglomerates and thereby lowers precipitator performance. Other amines and heterocyclic nitrogen compounds have intermediate agglomeration or dispersing effects between the above two extremes.

42538 **APTIC NO. 64764**

Pozniak, Donald J. and Robert M. Siewert

INLET THROTTLED AIR PUMP FOR EXHAUST EMISSION CONTROL. *(General Motors Corp., Detroit, Mich.) U. S. Pat. 3,785,152. 5p., Jan. 15, 1974. 2 refs. (Appl. Nov. 13, 1972, 8 claims).*

An inlet throttled air pump for exhaust emission control is described. It overcomes the difficulties of other systems by effectively reducing to a minimum the emissions during all modes of engine operation. Secondary airflow is continuously regulated as a function of engine operating conditions. It is continuously modulated to provide an air-fuel ratio within the exhaust emission control system which will not change significantly with changes in engine speed or load. The output of the pump is variable and controlled by inlet throttling to the air pump through the use of a control valve assembly. It has a differential fluid pressure actuated means to effect movement of a variable air valve in the air pump inlet. The differential fluid pressure signals are provided by engine intake manifold pressure and air pump inlet pressure.

42539 **APTIC NO. 66580**

Prokop, William H.

WET SCRUBBING OF INEDIBLE RENDERING PLANT ODORS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 132-150. 10 refs. (March 7-8.)*

Two case histories are presented to illustrate the use of wet scrubbing in the control of rendering plant odors. A combination of high intensity odors from screw press vents, blood dryer exhaust, raw feather receiving, feather noncondensables, feather cooker discharge, and feather dryer exhaust are treated with an odor removal efficiency of 99% by using a two-stage system consisting of a low-energy venturi scrubber with water sprays and a countercurrent-flow packed tower with recirculation of sodium hypochlorite solution. Odor removal is from 5000-20,000 odor units to 50-100 odor units, with an operating cost of $5.35/hr. Total installed cost is $110,000. A case of 90-95% odor removal efficiency for treatment of plant ventilating air is cited in which a countercurrent-flow horizontal spray type scrubber with sodium hypochlorite solution recirculated through the first stage and water recirculated through the second stage is utilized. Odor removal is from 200-1500 odor units at the inlet to 20-100 odor units at the outlet, with an operating cost of $11.50/hr. Total installed cost is $150,000.

42540 **APTIC NO. 66385**

Rasch, Rudolf

THE BINDING OF SULPHUR DIOXIDE IN ABSORPTIVE FLUE GAS CLEANING. *Ueber die Bindung von Schwefeldioxid bei der absorptiven Rauchgasreinigung). Text in German. Waerme, 80(4):57-61, 1974. 19 refs.*

Efforts to influence the dust in hard-coal-operated furnaces by addition of additives so that it assumes the properties of dust in soft coal-operated furnaces are not entirely new. The sulfur dioxide content in flue gases from soft coal power plants is low because 70% of the SO2 is bound by the alakline fly dust and is removed with the dust in electrostatic precipitators. In oil-fired power plants additives for flue gas desulfurization are nothing new. For binding of SO2 in hard coal power plants, calcium oxide in the form of quicklime, limestone, or dolomite, magnesium oxide, and ferric oxide in the form of maghemite is suitable. Temperature, residence time, dust density, and type of additive influence of the desulfurization process. A suitable mathematical calculation method for determining binding kinetics in dependence of the concentration of the pollutant components exists but its accuracy must still be checked by experimental results.

42541 **APTIC NO. 66584**

Rehmus, F. H.

CONTROL OF SLAG QUENCHING ODORS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 174-194. 8 refs. (March 7-8.)*

Slag pit variables, including correlations between pit dimensions, time interval between pours, and slag temperature when the pit is filled and ready for quenching, are analyzed to investigate the control of hydrogen sulfide slag quenching odors. Heat transfer analysis demonstrates the important effect of cycle pouring time on the slag temperature since the time between pours accounts for major heat loss for each layer; a 70% reduction in emission is achieved as a result of doubling the pit filling time. A 3 day air cooling period before quenching results in a 66% emission reduction. Analysis of the effects of oxidizing agents added to the quench water in relation to H2S emission indicates that 88% emission reduction is feasible after 3 days of air cooling plus 100 ppm potassium permanganate addition to the quench water.

42542 **APTIC NO. 61712**

Resler, E. L., Jr.

CORNELL S LOW POLLUTION INTERNAL COMBUSTION ENGINE. *Eng.: Cornell Q., 8(4):2-13, Winter 1974.*

A modified internal combustion engine with a flame muffler and new spark plugs was designed, built, and tested to reduce nitrogen oxide pollution without loss of power, performance, or gas mileage. Federal air pollution regulations and the fuel shortage inspired the development of this engine. The present automobile standards for carbon monoxide and nitrogen oxides are reviewed. Pollution formation mechanisms and methods to reduce pollutants are discussed. The design and operation of the Cornell engine, which is similar to a stratified charge engine, is reviewed. The engine has a modified cylinder, works on a rich fuel mixture, and has a flame muffler. The building and testing of the engine are described. The spark plug was changed to reduce NOx emissions. In a six-cylinder car at 35 mph, the NOx was reduced from 3500 ppm to 400 ppm.

42543 **APTIC NO. 66234**

Rieger, Franz

SOLENOID VALVE FOR RECYCLING EXHAUST GASES IN INTERNAL COMBUSTION ENGINES. *(Robert Bosch GmbH, Stuttgart (West Germany)) U. S. Pat. 3,791,360. 5p., Feb. 12, 1974. 3 refs. (Appl. Feb. 3, 1972, 6 claims).*

A solenoid valve for recycling exhaust gases from the exhaust pipe to the intake manifold of internal combustion engines is described which overcomes soiling and jamming problems associated with prior art devices of similar nature. The solenoid valve consists of a housing, a movable valve head for opening and closing the return conduit, an electromagnet held and externally spaced from the housing by a spacer tube affixed to the housing, and a valve rod passing through the spacer tube and carrying at one end the valve head while being secured at its other end to the movable armature of the electromagnet. (Author abstract modified)

42544 **APTIC NO. 66494**

Roy, A., F. A. Hagen, and J. M. Corwin

PERFORMANCE OF HEAT-RESISTANT ALLOYS IN EMISSION-CONTROL SYSTEMS. *Preprint, Society of Automotive Engineers, New York, 20p., 1974. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740093.)*

An extensive program was established to screen and evaluate heat- and corrosion-resistant alloys that may have some potential application in emission control systems anywhere from the exhaust manifold to the tailpipe. The various phases of this program, which include tests conducted in air and controlled exhaust atmospheres at temperatures between 1300 and 2200 F are described. Some selected test data and results of metallographic studies are presented to illustrate how representative alloys react to various test conditions. The characteristics and functions of the basic emission control devices are reviewed in light of their effect upon material requirements. The three major devices being evaluated are the exhaust manifold reactor, the reducing converter for oxides of nitrogen, and the oxidizing converter for controlling carbon monoxide and hydrocarbons. (Author abstract modified)

42545 **APTIC NO. 66367**

Rueb, Friedmund

CLOTH FILTERS IN DUST TECHNOLOGY. *(Gewebefilter in der Entstaubungstechnik). Text in German. Wasser Luft Betrieb, 18(9):487-494, 1974.*

A review is given of different kinds of cloth filters beginning with the oldest kind of cloth filter, the tubular filters with mechanical cleaning. They are still in use nowadays primarily for the collection of metal, wood, leather, or synthetic dusts. Two types can be distinguished here, the rectangular cell filter which can be optionally increased by adding individual filter cells, and the round filters. Tower cloth filters, mini-bag filters, and envelope type of cloth filters are described and illustrated. For cleaning and rapping devices air jets or compressed air is used. For dust collection from hot gas flows cloth filters are usually preceded by a gas cooler.

42546 APTIC NO. 66419

Russenberger, H. J. and H. U. Wanner

GERM CONCENTRATION OF INDOOR AIR IN DEPENDENCE OF AIR ENCHANGE. *(Keimgehalt der Raumluft in Abhaengigkeit des Luftwechsels). Text in German. Zentralbl. Bakteriol. Hyg. Infektionskr. Abt. Orig. A, 227(1-4):564-567, 1974.*

The hourly exchange rate of air is a decisive factor for the efficiency of an air conditioning system, particularly for maintaining a low germ level indoors. A schematic diagram of an air conditioner permitting a variation of air exchange from zero to 25 times/hr is provided. The outdoor air is cleaned by means of a preliminary dust collection filter, a fine dust filter, an activated coal filter and a hosch-filter. The germ number was measured with two slit samplers at air exchange rates of 0.3, 5, 10, 20 and 25 times/hr. In a naturally ventilated operating room about 700 germs/cu m were measured; in an air conditioned operating room with an air exchange of 12 times/hr about 300 germs/cu m and with an air exchange of 20 times/hr about 60 germs/cu m.

42547 APTIC NO. 66094

Sahnas, George

AIR COOLED ANTIPOLLUTION ENGINE. *(Assignee not given.) U. S. Pat. 3,792,691. 7p., Feb. 19, 1974. 9 refs. (Appl. Sept. 15, 1971, 6 claims).*

An air cooled, supercharged antipollution engine is described which uses diesel oil for fuel and spark plugs for igniting the fuel. The engine admits supercharged or compressed air into each cylinder each time the piston moves downwardly and just before it reaches lower dead center. The compressed air enters the cylinder at the time when the mixture of fuel and atmospheric air is admitted through the intake valve, causing a portion of the fuel to aerate and remain near the top of the cylinder, another portion to remain below the aerated portion, and a final portion to remain near the bottom in larger droplets below the small droplets. After ignition a second charge of compressed air is admitted just before the next time the piston reaches lower dead center. This second charge not only cools the cylinder and piston but also insures further and complete burning of the combustion gases so that the gas which is exhausted is clean. (Author abstract modified)

42548 APTIC NO. 66265

Scheffel, Heinz and Horst Srebotnik

ELECTRIC BUS PREHEATING, A MEASURE FOR REDUCING EXHAUST GAS EMISSIONS. *(Elektrische Bus-Vorheizung, eine umweltfreundliche Massnahme). Text in German. Energie (Munich), 26(7/8):251-253, July/Aug. 1974. 4 refs.*

Buses in the past have been warmed up during the cold winter season by running the engine idly which permits the activation of the bus heating system by warming up the cooling water. This practice has lead to considerable noise and exhaust gas emission in the early morning hours between 4 and 6 am and led to complaints by residents near bus parks. Experiences in Scandinavia therefore led to the testing of an electric heating system directly heating the engine cooling water during the night to 65 C. A cost comparison between the old method and the new electric heating yielded that cost parity is reached when 1 liter fuel oil assumes the sixfold price of one low-tariff kWh.

42549 APTIC NO. 66317

Searles, R. A.

CLEANER NITRIC ACID PLANT TAIL GASES. *Nitrogen, no. 88:38-42, March/April 1974. 16 refs.*

Methods for removing the concentrations of nitrogen oxides from the tail gas in nitric acid production are discussed. Residual concentrations of nitrogen dioxide and nitric oxide give rise to a pollution problem. A typical HNO3 plant of 350 tons pd capacity emits about 20,000 scfh of tail gas. The total NOx emissions are over 5 tons/day. Exposure of man to NO2 at levels of 300 ppm may cause fatal broncho-pneumonia. Long term exposure of plants to NO2 at levels below 1 ppm can damage leaves and decrease fruit yield. Specific removal methods discussed include: absorption, adsorption, catalytic combustion, decolorization, and catalytic reactions. The composition and form of the catalyst has an important bearing on the flexibility of operating, the degree of abatement achieved, the efficiency of fuel combustion, and catalyst life. The costs of operating a nitric acid plant without abatement are compared to operating the plant using platinum metals impregnated onto ceramic honeycomb supports as catalysts.

42550 APTIC NO. 66509

Shannon, L. J., M. P. Schrag, F. I. Honea, and D. Bendersky

ST. LOUIS/UNION ELECTRIC REFUSE FIRING DEMONSTRATION AIR POLLUTION TEST REPORT (FINAL REPORT). *Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Contract 68-02-1324, Task II, Program Element 1AB013, Rept. EPA-650/2-74- 073, ROAP 21AQQ010, 119p., Aug. 1974. 9 refs.*

The effects of mixed fuel firing on boiler emissions and electrostatic precipitator (ESP) performance were investigated using shredded municipal wastes as a supplementary fuel in a 140 megawatt coal fired utility boiler. Test measurements included: total particulate, particulate size distribution, oxygen, carbon dioxide, carbon monoxide, nitric oxide, sulfur dioxide, sulfur trioxide, chloride ion, mercury subscript v, in situ fly ash resistivity, and ESP operating conditions. Firing mixed fuels caused no statistically significant changes in gaseous pollutant emissions. Particulate stack emissions increased as a result of an ESP performance loss related to changes in ESP electrical operating conditions and gas flow volumes. Excessive sparking rates on some mixed fuel tests indicated that the ESP could have been tuned for better collection. The performance of the precipitator was significantly affected by the fuel mix (coal and waste). (Author abstract modified)

42551 APTIC NO. 66507

Shaw, H. and E. M. Magee

EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES; GASIFICATION; SECTION 1. LURGI PROCESS (FINAL REPORT). *Exxon Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract 68-02-0629, Program Element 1AB013, Rept. EPA-650/2-74-009-c, ROAP 21ADD-023, GRU.5DJ.74, 76p., July 1974. 61 refs.*

A process analysis of the Lurgi Dry Ash Gasification Process for high Btu gas was conducted. The process was reviewed from an environmental standpoint. The waste stream compositions were calculated for a 250 MM scfd synthetic natural gas plant using a subbituminous coal. The quantities of solid, liquid, and gaseous pollutants were estimated including nitrogen oxides, sulfur, particulates, hydrocarbons, and trace metals. The thermal efficiency for various process alternatives was calculated. Process modifications were suggested for reducing pollution and/or increasing thermal efficiency. The technology needed to control pollution are assessed. (Author summary modified)

42552 **APTIC NO. 62866**

Shchepochkin, A. M. and Y. V. Garasko

THE EFFICIENCY OF DUST SEPARATORS WITH ROTARY WIRE MESH FILTERS IN THE REMOVAL OF BACTERIA AND MOLDS FROM THE AIR. *(Effektivnost ochistki vozdukha ot bakteriy i plesnevykh gribov pyleulavlivayushchey ustanovkoy s fil trami SVF). Text in Russian. Gigiena i Sanit., no. 2:98-99, 1974. 4 refs.*

The efficiency of a new rotary wire mesh filter in the removal of dust, bacteria, and molds from the air of cotton mills was studied. The air to be purified had dust and bacteria concentrations of 92.5 mg/cu m and 72,200 colonies per cu m, a temperature of 25-29 C, and a relative humidity of 45-52%. The rotary wire mesh filter reduced the bacteria concentration by 14-24 times, corresponding to an efficiency of over 90%.

42553 **APTIC NO. 66135**

Soniassy, R. N.

ADSORPTION OF ODOURS BY PEAT MOSS. *Can. Mining Met. Bull. (Montreal), 67(748):95-98, Aug. 1974. 11 refs.*

Experiments using dimethylamine, ammonia, and hydrogen sulfide were conducted to determine the feasibility of using peat moss as an adsorbent for odors. Peat moss possessed 30-38% of the adsorptive capacity of activated charcoal and that the effective life of the peat filters was 14-23% of that of similar sized activated charcoal filters. Therefore, peat moss is not a useful alternative for the adsorption of the odorous gases tested. Also, the relatively large critical bed depths of peat moss filters (0.8-2.0 cm compared to 0.2 cm for activated charcoal) showed that peat moss cannot be used in miniature units such as gas masks.

42554 **APTIC NO. 66217**

Sood, Ajay and J. R. Kittrell

DUAL BED CATALYST FOR SIMULTANEOUS REDUCTION OF SULFUR DIOXIDE AND NITRIC OXIDE WITH CARBON MONOXIDE. *Ind. Eng. Chem., Prod. Res. Develop., 13(3):180-185, Sept. 1974. 19 refs.*

For the simultaneous reduction of sulfur dioxide and nitric oxide by carbon monoxide, a dual-bed catalyst was studied, consisting of iron-chromia as a first bed, followed by activated alumina as a second bed. The thermodynamic equilibrium predictions and the experiment are described. Undesirable carbonyl sulfide formed on the first bed reacted with SO2 in the second bed to yield sulfur. Greater than 90% reduction of both SO2 and NO at approximately 700 F and high space velocity (approximately 20,000/hr) was demonstrated with tubular flow reactors using simulated flue gases. Variations in catalyst temperature could adjust the COS:SO2 ratio to that required stoichiometrically and also could counterbalance any changes due to fluctuating CO feed level. (Author abstract modified)

42555 **APTIC NO. 66480**

Sparks, L. E., J. D. McCain, and W. B. Smith

PERFORMANCE OF A STEAM-EJECTOR SCRUBBER. *Environmental Protection Agency, Washington, D. C., Control Systems Lab. and Southern Research Institute, Birmingham, Ala., EPA Contract 68-02-1308, Task 11, 16p., Aug. 1974. 1 ref.*

Fractional and overall mass efficiency tests were performed on one of seven modules of a full scale steam-ejector scrubber used for controlling particulate emissions from an open hearth furnace. Total flue gas particulate mass concentrations were determined at the inlet and outlet of the scrubber by Method 5 techniques. Measurements were made under several scrubber operating conditions. The measured efficiencies based on total particulate mass concentrations with the scrubber operating under near optimum conditions ranged from 99.84 to 99.9%. The measured fractional efficiencies ranged from a maximum of 99.99% for particles having diameters of 1 micron to values of 97 and 99.9% for particles having diameter of 0.1 micron and 5 micron, respectively. Brief descriptions of the open hearth process, steam-ejector scrubber, the measurement methods for calculating the fractional efficiency, and fractional efficiencies as measured for several scrubber operating conditions are presented. (Author abstract modified)

42556 **APTIC NO. 66380**

Steuernagel, Walter

COLLECTOR ELECTRODE FOR ELECTROSTATIC PRECIPITATOR. *(Metallgesellschaft Aktiengesellschaft, Frankfurt am Main (West Germany)) U. S. Pat. 3,793,804. 5p., Feb. 26, 1974. 7 refs. (Appl. April 17, 1972, 8 claims).*

A collector electrode arrangement for electrostatic precipitators is presented which overcomes prior art design problems concerning the collection of dust in the precipitator channels and the necessity for reprecipitation. The collector electrode consists of a sheet metal strip reinforced by a channel structure and has corrugations in the form of flat trapezoid sections with open broad bases turned in opposite direction and running along the length of the strip. The strips have overlapping flanges where they adjoin and comprise at least three such trapezoidal sections. (Author abstract modified)

42557 **APTIC NO. 66267**

Stoefen, Detlev

TOXICOLOGICAL ASPECTS OF THE APPLICATION OF METHANOL AS FUEL FOR AUTOMOBILES. *(Toxikologische Aspekte der Verwendung von Methanol als Autotreibstoff). Text in German. Umwelthygiene, 25(8):163-165, 1974. 9 refs.*

In the U. S. and the Federal Republic of Germany there are reports of the considerable technical and economic advantages of the use of methanol as fuel for automobiles and on the environmental superiority of the originating exhaust gases. An evaluation of the methanol concentrations in the atmosphere of large towns leads to the conclusion that these concentrations are tolerable on the whole. The low boiling point of methanol and the resulting larger evaporation is compensated for by better combustion in the engine. The maximum allowable emission concentration for methanol in the Federal Republic of Germany for long-term inhalation is 15 mg/cu m, in Soviet Russia it is 0.5 mg/cu m (as diurnal average).

42558 **APTIC NO. 66103**

Sutherland, K. N.

THE CONTROL OF NOX EMISSION IN POWER PLANT OPERATIONS. *Clean Air (J. Clean Air Soc. Australia New Zealand), 8(2):37-41, May 1974. 2 refs.*

Processes for the control of nitrogen oxides emission in power plant operations are discussed. Power plants are responsible for 3 times 10 to the 6th power tons/yr of NOx. The most commonly used controls are two-stage combustion, low excess air, and gas recirculation through the burners. Thermal NOx and fuel NOx can be both substantially reduced. Practical experience with NOx control is still very limited, particularly in the area of burner stability and burner management. (Author abstract modified)

42559 **APTIC NO. 64864**

Suzuno, Shinichi, Hiroshi Kiyono, Takeshi Fukatani, and Hitoshi Mitsumori

THE VALVE SEAT FOR THE INTERNAL COMBUSTION ENGINE. *(Nainen kikan no benza). Text in Japanese. (Nissan Automobile Co. (Japan) Japan. Pat. Sho 49-17968. 7p., May 7, 1974. (Appl. Aug. 7, 1970, 1 claim).*

A valve seat for internal combustion engines made of abrasion-resistant sintered steel materials with infiltrated lead or lead alloy which can withstand the use of new no-lead fuels is described. The valve seat material which undergoes repeated expansion and contraction at high temperature under presssure requires not only abrasion resistance but also thermal stability and fatigue resistance. An iron-type sintered alloy consisting of 2-4 wt% chromium, 0.2-0.4 wt% of molybdenum, 0.2-0.4 wt% vanadium, 0.6-1.2 wt% carbon and the remaining portion iron infiltrated with lead or low melting point lead alloy was developed. The lead alloy contains at least one type of metal selected from among tin, antimony, cadmium, and bismuth. The valve seat made of material infiltrated solely with lead is suitable for relatively high temperature engines, while the one infiltrated with low melting point lead alloy is suitable for relatively low temperature engines. The tensile strength, hardness, Young's modulus, elastic limit, and coefficient of linear expansion tested before and after the lead infiltration showed an improvement in the thermal stability. A bench endurance test was conducted by mounting the valve seat in a four cylinder engine, and the abrasion of valve seat determined by measuring the increase in tappet space showed a marked improvement compared to that of the existing valve seats.

42560 **APTIC NO. 66376**

Tomany, James P. and George H. Cash

VENTRI-SPHERE HIGH ENERGY SCRUBBER. *(Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,793,809. 6p., Feb. 26, 1974. 4 refs. (Appl. Dec. 21, 1972, 5 claims).*

A two-stage venturi-type scrubber for removing extremely fine particulates from particle-laden gas streams is described which overcomes problems of prior art venturi scrubber designs relating to plugging and the use of fixed bed packing or filter arrangements. A first stage downflow through the venturi section is provided, with the wetted particles being discharged into a lower slurry collection section. A reverse flow up through a second stage scrubber zone follows, wherein a light weight mobile packing provides surface area for countercurrent scrubbing in the presence of a descending sprayed liquid. A preferred embodiment of the invention utilizes a flexible venturi throat section which is mechanically adjustable to provide a variable cross-sectional area that is changed in response to variations in gas and liquid volumes to sustain a substantially constant pressure drop across the throat section. The unit may also incorporate several sloping vanes above the mobile packing zone to effect further liquid de-entrainment from the clean gas stream prior to its discharge from the unit.

42561 **APTIC NO. 66145**

Tsai, Shih-Yi and Bernard Otterman

PARTICLE COLLECTION BY MEANS OF LOW FREQUENCY SOUND WAVES. *Atmos. Environ., 8(9):873-884, Sept. 1974. 9 refs.*

Particle agglomeration in an aerosol containing fine particles and much larger collecting particles is analyzed for the case where the aerosol is subjected to a low frequency space and time dependent oscillatory motion. By means of a continuum approach, equations describing both the variations of densities of large and small particles with respect to time and space are derived. In addition, the effciency of particle collection is determined. The latter is a function of oscillating frequency, oscillation velocity amplitude, speed of sound in the gas, and the relaxation time constants of the particles. The high collection efficiency can be achieved in high intensity, low frequency sound waves. The theoretical prediction for the rate of agglomeration for a two-particle-size aerosol can be applied to achieve a device for collection and removal of micron and sub-micron particles. (Author abstract modified)

42562 **APTIC NO. 66207**

Turbin, Kenneth L.

APPARATUS FOR DEHUMIDIFYING AND DILUTING A WET GAS STREAM. *(The Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,792,572. 6p., Feb. 19, 1974. 4 refs. (Appl. June 2, 1972, 1 claim).*

A method for reducing the humidity and lowering the temperature of a wet gas effluent stream before discharging the stream to the atmosphere and, hence, reducing the tendency of the effluent to form fog plumes and result in drizzle precipitation is presented to overcome prior art deficiencies concerning excessive heat energy requirements, difficulty in predicting the minimum amount of super heat required, and fairly large cooling water requirements. The process involves passing the wet gas through a heat exchanger positioned in a main chamber, while simultaneously cooling the wet gas stream by an ambient temperature air stream which is drawn into the main chamber and forced past the heat exchanger. The condensate in the cooled wet stream is removed in a second chamber, and the remaining gas phase is dispersed back into a mixing compartment of the main chamber where the gas phase of the effluent stream mixes with the ambient air, diluting the effluent and reducing its humidity before the stream is discharged to the atmosphere. (Author abstract modified)

42563 **APTIC NO. 66575**

Waid, Donald E.

THERMAL OXIDATION OR INCINERATION. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 62-79. (March 7-8.)*

Thermal oxidation or incineration of organic air pollutants, including odors, is reviewed in terms of operating variables, efficiency, design considerations, and process economics. Flow rates from 300-30,000 scfm of effluent are normal for thermal incineration units, with effluent temperatures normally ranging from 250-600 F. Pollutant concentrations in the effluent vary from as low as 50 ppm to as high as 17,000 ppm by volume for hydrocarbons, while carbon monoxide concentrations in the oven effluent are normally very low, ranging from 10-100 ppm usually. The combustion chamber is normally designed to give an average residence time of 0.3-1.0 sec at operating temperature for the effluent being processed. Capital investment for thermal oxidation equipment ranges from $4 to $12/scfm and is dependent on the following variables: size of unit-total scfm of the effluent, amount and type of heat recovery attempted, design operating temperature, and the basic design of the thermal oxidizer. Factors which reduce the fuel required include: the use of heated effluent air for combustion, the presence of combustibles (hydrocarbons) in the effluent stream, reduction in effluent flow, and reduction in operating temperature. Thermal incineration can be used to control any odor which can be diminished or eliminated by oxidation.

42564 **APTIC NO. 66125**

Waki, Koichi, Tadashi Suzuki, and Toshinobu Mitsui

METHOD AND APPARATUS FOR PURIFYING WASTE GAS. *(Showa Denko Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,792,571. 10p., Feb. 19, 1974. 11 refs. (Appl. April 2, 1971, 2 claims).*

A method for the treatment of fluoride-containing waste gases emanating, in particular, from electrolytic cells in aluminum manufacturing plants is described which has a high operational efficiency, low equipment cost, and ease of handling as compared to existing conventional methods. The method accomplishes the adsorption of impurities chiefly under a dry adsorbent condition; and, therefore, the replacement of the exhausted adsorbent can be effected simply by intermittent spraying. The method consists of spraying an adsorbing solution of sodium carbonate, sodium hydroxide, or a mixture of the two onto a packed bed, depositing the adsorbing substance from the solution as an adsorbent on the packed bed by removal of the solution solvent, causing the impure substances present in the gas to be adsorbed by the packed bed adsorbent, and, upon degradation of the adsorbent's activity, removing the adsorbent by washing and subsequently depositing fresh adsorbent on the packed bed by again spraying with the adsorbing solution. The method is also effective for the removal of gases such as chlorine, sulfur dioxide, and hydrogen cyanide.

42565 **APTIC NO. 66410**

Walkenhorst, Wilhelm

DEMANDS ON A DUST COLLECTOR AND POSSIBILITIES FOR REALIZATION. *(Anforderungen an Entstauber und Moeglichkeiten zur Realisierung). Text in German. Staub, Reinhaltung Luft, 34(8):300-305, Aug. 1974. 5 refs.*

A distribution function taken from the literature is given for the volume and mass distribution of respirable fine dust. It allows, along with the separation function of a dust separator, the calculation of the gravimetric separation and flow rate. Separation functions for wire grids and fiber filters are given at flow velocity angles below 90 and 20 degrees. At the high velocities used here, about 10 m/sec or more, the adhesive strength is decisive for dust capture. Oil and water with reduced surface tension can be used as adhesive. Water may serve simultaneously as a cleaning agent. The result is a self-cleaning filter. Demands on the separation efficiency are discussed and solutions are given to satisfy them.

42566 **APTIC NO. 66266**

Weitzel, Hans

WASTE AIR INCINERATION IN THE BAYER PLANT DORMAGEN. *(Abluftverbrennungsanlage im Bayerwerk Dormagen). Text in German. Umwelthygiene, 25(8):175-176, 1974.*

The Bayer plant in Dormagen operates a thermal combustion plant for elimination of odorous waste air. The plant began to operate in early summer of 1972. At the core of the plant is an incinerator of the form of a divided cylinder with a length of 15 m and a diameter of 1.50 m. It is equipped with a combination burner for gas and oil. Up to 15,000 cu m air/hr can be incinerated. The waste air enters the furnace at two points, once as combustion air into the flame chamber with a temperature of 1200 to 1400 C and the rest with a temperature of 800 C into the combustion chamber. Examinations have shown that combustion at 800 C is complete. Prior to discharge of the air into the atmosphere it is mixed with cold air for cooling to 300 C. Investment costs amounted to about $1,000,000, operation costs annually amount to about $333,000.

42567 **APTIC NO. 64809**

Woodard, A. M.

REDUCE PROCESS HEATER FUEL. *Hydrocarbon Process., 53(7):106-108, July 1974.*

Process heaters typically account for over half the total refinery fuel consumption. By improving the efficiency of process heaters, less fuel will be consumed and less flue gases will be produced. Maximum efficiency can be obtained by flue gas monitoring and control. Flue gas oxygen content can be determined to provide a predictable correlation with excess air over a wide range of fuel oil and gas composition. Preventable fuel loss is obtained by subtracting stack loss at the target excess oxygen from that at the determined excess oxygen, assuming constant stack temperature. The difference, expressed decimally, is then multiplied by the fuel fired if it is metered; if it is not metered, the fuel fired may be calculated from the process duty and heater efficiency. A system for flue gas monitoring and control is described. Means of providing maximum heater efficiency are outlined. These include minimizing excess oxygen; providing negative draft below convection section; insuring equal air flow to all burners; and equalizing fuel flow to all burners.

42568 **APTIC NO. 66090**

Woodward, Gary F.

EGR WARNING SYSTEM. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,794,006. 7p., Feb. 26, 1974. 5 refs. (Appl. Dec. 6, 1972, 6 claims).*

A warning system for an automobile equipped with exhaust gas recirculation is described which is cumulative in responding to failures in both the control of EGR and the actual functioning of EGR. The system employs series switches to control an electrical circuit for energizing an indicator; one switch is subject to an engine vacuum signal serving also to control admission of exhaust gas recirculation, while another switch is subject to differential pressures on opposite sides of a restrictor in the recirculation flow to sense a failure of recirculation. (Author abstract modified)

42569 **APTIC NO. 62517**

Yamada, T.

ELIMINATION OF NITRIC OXIDES. *(Chisso sankabutsu no jokyo). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 27(3):214-217, March 1974.*

Sources of nitrogen oxides, the environmental standard for NOx, the mechanism of production of NOx, and methods of elimination of NOx are described. Seventy percent of exhausted NOx comes from fixed sources such as boilers. According to Zelddvich s mechanism of nitric oxide production, the production of NNO increases at higher temperature and at higher concentrations of oxygen. No production according to fuel decreases in the order of coal, C heavy oil, A heavy oil, light oil, methane, city gas, and methanol. The burning operation of fuel can be improved by reducing the concentration of oxygen, by supplying air in two steps for lowering the combustion temperature, or by mixing exhausted gas with the air for combustion. These operations reduce NOx concentration by 30-50% without loss of heat efficiency. Methods of elimination of NOx from smoke are catalytic reduction by carbon monoxide, hydrogen, and methane, selective, catalytic reduction by NH3, and oxidation by ozone and potassium permanganate. These methods need further study for practical use.

42570 **APTIC NO. 66374**

Yamamoto, Kenichi

METHOD FOR REDUCING EXHAUST NOXIOUS EMISSION OF ROTARY ENGINE AND THE SYSTEM THEREFOR. *(Toyo Kogyo Co., Ltd., Aki-gun, Hiroshama-ken (Japan)) U. S. Pat. 3,791, 145. 6p., Feb. 12, 1974. 7 refs. (Appl. March 8, 1972, 19 claims).*

A system for reducing unburned and partially burned noxious gases emitted from automotive rotary combustion engines having an exhaust gas cleaner is described. It further reduces emissions because the leading and trailing portions of the engine chamber under compression contain air-fuel mixtures of different mixture ratios. A fresh air-fuel mixture existing in the engine chamber is periodically introduced into the exhaust system directly into or upstream of the exhaust gas cleaner in response to the compression condition of the engine chamber, thus improving the afterburning condition of the exhaust gas cleaner through warming. An enriched mixture left behind in a trailing portion of the engine chamber may exclusively be drawn into the cleaner to make uniform the mixture ratio distribution in the whole engine chamber. The mixture may be shut off when the operating temperature of the cleaner is above a predetermined level. (Author abstract modified)

42571 **APTIC NO. 66097**

Yoshida, Kunio and Daizo Kunii

COMPLEX REACTION IN FLUIDIZED BEDS--SIMULATION OF GASIFICATION--. *J. Chem. Eng. Jap., 7(1):34-39, Feb. 1974. 17 refs.*

Theoretical equations are derived to simulate the performance of fluidized bed reactors in which complex reactions take place. Fluidized beds are an effective way to reduce processing fuel costs and air pollution. Calculation procedures are given for gasification by air or steam as well as regeneration of deposited carbon on fluidized particles. A good fit of reported data with the predicted values was obtained. (Author conclusions modified)

42572 **APTIC NO. 65967**

Yoshizumi, K. and T. Oodaira

CHANGES IN PROPERTIES OF CATALYST FOR CONTROLLING AUTOMOBILE EXHAUST EMISSIONS. *In: Annual Report of the Tokyo Metropolitan Research Institute for Enviromental Protection. Tokyo Metroplitan Research Inst. for Environmental Protection (Japan), p. 15-22, 1974. 9 refs.*

Various factors affecting catalytic durability of automobile catalytic afterburners were studied using a four-cylinder, four-cycle Japanese car. The catalysts registered a large decrease in purifying efficiency during the 3000 km running test. Also, the amount of packed catalysts dropped to about 1/3 the original level. The changes were analyzed in terms of the catalyst property. The catalyst consisted mainly of amorphous copper oxide-alumina, part of which was crystallized in the form of CuO and copper aluminate. Iron and chromium were added. After use, CuO disappeared and crystallization of CuAl2O4 progressed. The specific surface area after use decreased to about 40% of the original area. Catalyst intensity after use was about 1/4 of its original intensity. Lead was deposited on the used catalyst. The activity of the catalysts declined because of crystallization due to the formation of spinels, because of the surface area decrease due to sintering, and because of the poisoning caused by the deposition of Pb on the catalyst surface. Catalyst intensity declined after the catalyst was subjected to repeated heating and cooling in the converter, and part of the pulverized catalyst was discharged into the air, resulting in a drop in purifying efficiency due to the increased catalyst amount. Since the catalysts had failed to pass the purifying efficiency confirmation test, results do not detract from the effectiveness of the catalytic converter. (Author conclusions modified)

42573 **APTIC NO. 66134**

Zabolotny, Ernest R., Wendell J. Biermann, and Peter L. Chang

PROCESS FOR REMOVING POLLUTANTS FROM GAS STREAMS. *(Carrier Corp., Syracuse, N. Y.) U. S. Pat. 3,793,171. 14p., Feb. 19, 1974. 7 refs. (Appl. Sept. 4, 1970, 38 claims).*

A process for removing oxidizable impurities from waste gas streams is described which is regenerable and is not limited by prior art difficulties such as removal of reaction deposits, adsorbent surface area limitations, and the requirement for expensive heating and/or cooling steps. The method consists of contacting the gas stream with an aqueous acid stream containing an electrolytically regenerable oxidizing agent. After a sufficient contact time for removal of the oxidizable inpurities from the gas stream, the gas stream is removed from the contact area and vented or further treated. The aqueous acid stream containing the electrolytically regenerable oxidizing agent and oxidizable impurities is also removed from the contact area, and the electrolytically regenerable oxidizing agent is regenerated, with the above described cycle being repeated. The regenerable metal oxidizing agent is preferably trivalent cobalt, and the aqueous stream preferably contains sulfuric acid. Destruction of oxidizable impurities is continuous throughout the system, including the mass transfer contact area, the electrolytic regeneration area, and in all process interconnections. (Author abstract modified)

42574 **APTIC NO. 62925**

Environmental Protection Agency, Research Triangle Park, N. C., Test and Evaluation Branch

EFFECT OF THE JOHNSON GASOLINE ADDITIVE ON EMISSIONS. *Rept. 74-26 AW, 3p., March 1974.*

A fuel additive material of processed white oil which is heated, chilled, and aerated, mixed with a small quantity of an ether and an aromatic oil, and further aerated, was tested for effects on engine emissions and fuel economy. While slight reductions in hydrocarbons and nitrogen oxides were indicated, they were of a magnitude which did not allow determination of whether normal vehicle and test variability or the additive was responsible for the changes. The reduction measured for carbon monoxide was much less than that shown in the data supplied by the additive's inventor.

42575 **APTIC NO. 64957**

(Inventor not given.)

METHOD AND APPARATUS FOR PURIFYING WASTE GAS. *(Showa Denko Kabushiki Kaisha, Tokyo (Japan)) Brit. Pat. 1,348,161. 10p., March 13, 1974. (Appl. April 19, 1971, 6 claims).*

This invention relates to a method and apparatus for the absorption of noxious impurities such as chlorine, sulfur dioxide, and hydrogen cyanide and the like from a waste gas containing such noxious substances. The invention treats waste gases of widely varying fluoride content, ranging from a level of 1000 ppm to 10 ppm and is particularly effective for the treatment of waste gases containing fluorides at low concentrations. The process comprises a cycle, the steps of which include: spraying into a packed bed contained in a suitable vessel a solution containing an absorbent substance capable of reacting with impurities and depositing the substance as an absorbent in solid form on the packed bed; passing a gas containing impurities through the packed bed causing the impurities present in the gas to react with the absorbent deposited on the packed bed; and, upon degradation of the activity of the absorbent deposited on the packed bed, removing the absorbent and simultaneously or subsequently repeating the first step by depositing fresh absorbent on the packed bed. This method has high operational efficiency, low equipment cost, and ease of handling. It accomplishes the absorption of impurities chiefly under a condition in which the absorbent is dry and, therefore, the replacement of the exhausted absorbent is only required to be effected through intermittent spraying. In this respect, the amount of water used is extremely small and the amount of water to be drained can consequently be decreased to a great extent.

42576 **APTIC NO. 66273**

Dept. of the Interior, Washington, D. C., Office of Coal Research

CLEAN ENERGY FROM COAL TECHNOLOGY. *43p., 1974.*

GPO

A review is presented on technology designed to achieve full utilization of coal for the production of clean burning solid, liquid, and gaseous fuels. Topics covered include: the production of high energy gas, low-Btu fuel gas, and liquid- solids from coal: coal-oil-gas refineries; electric power generation from coal; and mining and reclamation. Schematics, descriptions, and fact sheets are provided for the HYGAS, carbon dioxide acceptor, BI-GAS, Synthane, COED (char-oil-energy-development), SRC (solvent refined coal), and fluidized bed processes of coal conversion.

42577 **APTIC NO. 66276**

Environmental Protection Agency, Washington, D. C., Technology Assessment and Evaluation Branch

PERFORMANCE OF THE ELECTROSPORT ELECTRIC VEHICLE. *Rept. 75-3 AEB, 20p., June 1974. 2 refs.*

The performance of an American Motors Hornet station wagon modified for electric operation was evaluated. The road and dynamometer tests are detailed. During the vehicle dynamometer testing there were considerable odors during heavy load conditions. This was probably either hot insulation or gases from the rapidly discharging batteries.

42578 **APTIC NO. 66277**

Environmental Protection Agency, Washington, D. C., Office of Mobile Source Air Pollution Control

EXHAUST EMISSIONS TESTS OF THE CARTER STEAM CAR. *Rept. 74-31 AEB, 20p., June 1974.*

Exhaust emission tests were conducted with the Carter Rankine cycle system installed in a Volkswagen station wagon. Fuel used was a blend of 50% (by volume) Indolene gasoline and 50% kerosene. The mass emissions met the original 1976 statutory emission levels of .41 gpm hydrocarbons, 3.4 gpm of carbon monoxide, and .4 gpm of nitrogen oxides. The average composite result of the two Environmental Protection Agency tests was hydrocarbons .37, CO 1.2, and NOx .36 gpm. The cold start portion of the test created the greatest problem, particularly for hydrocarbons.

42579 **APTIC NO. 66284**

Environmental Protection Agency, Washington, D. C., Office of Mobile Source Air Pollution Control

EXHAUST EMISSIONS FROM TWO MEDIUM DUTY TRUCKS EQUIPPED WITH THE DANA-UOP TRUCK RETROFIT SYSTEM. *Rept. 75-6, AWK, 7p., July 1974.*

Exhaust emission tests are conducted with two medium duty trucks equipped with the Dana-UOP truck retrofit system. The system consists of an UOP catalyst and a Dana exhaust gas recirculation system called the Dana Retronox. There was a 74% and 87% reduction in hydrocarbons, a 72% and 86% reduction in carbon monoxide, and 4% and 9% reductions in nitrogen oxides. Carbon dioxide was up 18% and 22%.

42580 **APTIC NO. 66291**

National Academy of Sciences, Panel on Testing, Inspection, and Maintenance

FEASIBILITY OF MEETING THE 1975-76 EXHAUST EMISSION STANDARDS IN ACTUAL USE (FINAL REPORT). *255p., June 1973. 74 refs.*

A report is presented on the feasibility of meeting the 1975-76 automobile exhaust emission standards in actual use for 50,000 mi. Topics covered include: elements of the total testing and maintenance sequence, testing and maintenance methods, factors affecting feasibility, and an analysis of evidence on feasibility. Appendices are also provided covering quality control functional tests, short emission tests, estimation of emission related parts cost, and the effect of untreated exhaust. Proposed control systems, particularly the catalyst, are significantly less durable than present hardware, and the service industry will not be properly trained and equipped by 1975 to perform required maintenance. Also, state programs ensuring the mandatory maintenance will not be operable by 1975. Thus, proposed 1975-76 vehicles will not meet the standards in actual use. A minority report by one of the members of the Panel on Testing, Inspection, and Maintenance is submitted as an attachment to the main report and lists major points of criticism with respect to the main report s conclusions.

1973

42581 **APTIC NO. 63389**

Adams, Frank H.

NEW TECHNOLOGY COMPLEMENTS AN ALIPHATIC ROUTE TO FUTURE GASOLINES. *Proc. Am. Petrol. Inst., Div. Refining, vol. 53:104-122, 1973. 3 refs.*

The effect of producing a higher volatility unleaded fuel in an existing refinery is reviewed. A drastic reduction in gasoline yield of about 14.5 liquid volume % was noted when the higher volatility was achieved primarily by the use of distillation to reduce gasoline endpoints. It would be unrealistic to consider an immediate move in the direction of higher volatility by this technique at a time when gasoline is already in a short supply. Consideration is also given to refining techniques which can be used to produce higher volatility gasoline without significant yield loss. The technology is available to produce this new product, if the petroleum industry is given a reasonable time to make the necessary changes. Increasing fuel volatility would reduce pollution from vehicles by removing lead antiknock additives which would thus reduce lead emissions and by permitting the use of a quick choke which would minimize hydrocarbon and carbon monoxide emissions during warm-up. (Author summary modified)

42582 **APTIC NO. 62776**

August, Paul

IMPROVEMENTS IN THE APPRATUS FOR THE COMBUSTION OF EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES. *(Assignee not given.) Brit. Pat. 1,307,684. 9p., Feb. 21, 1973. (Appl. Sept. 15, 1970, 5 claims).*

An apparatus for the combustion of exhaust gases from internal combustion engines is described. The apparatus holds a catalyst of steel wool or steel shavings in an exhaust stream so that only a portion of the exhaust gases go through the device, depending on the power developed by the engine at any specified time. The unburned constituents in the exhaust gas are oxidized and reduced to a level which satisfies the California test and Europa test. Unlike other devices, this apparatus does not require a large space to be mounted and does not cause power loss at full load.

42583 **APTIC NO. 63375**

Bellan, Josette Rosentweig and William A. Sirignano

A THEORY OF TURBULENT FLAME DEVELOPMENT AND NITRIC OXIDE FORMATION IN STRATIFIED INTERNAL COMBUSTION ENGINES. *Combust. Sci. Technol., 8(1):51-68, 1973. 13 refs.*

A theoretical model of turbulent flame propagation in a reciprocating stratified charge engine is developed, and calculations of temperature and species concentrations as functions of space and time are made. Also, pressure is calculated as a function of time. A spacial variation of mixture ratio is considered such that there is a fuel-rich region in the center the cylinder and a fuel-lean region near the cylinder walls. The spark in the fuel-rich region results in a premixed-type of flame propagating toward the walls. A diffusion-type flame results in the wake of the other flame due to the mixing of the excess air and fuel. The theoretical model of the fluid mechanical equations associated with chemical kinetics is essential to any parametric study of this type. The turbulent diffusivity concept allows one to account for the turbulent motion of the gases. A larger stratification may account for important fractions in the reduction of nitric oxide. From the point of view of NO reduction and minimizing the loss in efficiency, it is preferable to have a large stratification with a higher turbulent mixing than the opposite. (Author abstract modified)

42584 **APTIC NO. 66556**

Betti, S. and F. Gianfranchi

DESCRIPTION OF APPARATUS FOR CAPTURE AND PURIFICATION OF SMOKE FUMES PRODUCED BY NEW LD STEEL MILL. *(Descrizione dell impianto di captazione e depurazione dei fumi prodotti dalla nuova acciaieria LD). Text in Italian. Metallurgia Ital., 65(10): 578-580, 1973.*

The flue gas purification system of a new LD steel mill is described. The flue gases leaving the oxygen converters at 1750 C and containing mostly carbon monoxide and iron oxide particles are captured by hoods which also provide for the final incineration of CO and for cooling by a water spray. The flue gases are cooled further to 260 C in the spark box by a water spray, after which the dust is separated in venturi scrubbers by means of water. Droplet separation is done in a cyclone. The purified gases are cooled further to 60 C prior to discharge into the atmosphere. At an initial dust concentration of 15 g/N cu m, the residual dust concentration amounts to 30 mg/N cu m.

42585 **APTIC NO. 65975**

Black, Craig and William E. Sebesta

EXPERIENCE WITH POLLUTION ABATEMENT. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 117-127, 1973.*

Removal of particulates from blast furnaces and coke plant operations in the steel industry are reviewed. Three efficient collection techniques can be used for particulate matter: electrostatic precipitators, high energy scrubbers, and fabric filter systems. The characteristics of dust-laden exhausts which are usually considered before the choice of equipment is made are: temperature, combustibility of the exhaust, humidity of the raw gases, particle size characteristics of the particulates, chemical composition of dust, and characteristics of dusts that promote or discourage recycling. These characteristics are discussed. Specific experiences in air pollution control using the three control methods are reviewed.

42586 **APTIC NO. 66307**

Bonne, Ulrich

SOURCE EMISSION CONTROL - THE KEY TO CLEAN AIR. *Honeywell Comp. J., 7(3):199-206, 1973. 25 refs.*

Computer modeling of different designs for combustion processes is discussed in terms of combustion emissions, health aspects, pollution regulations, emissions monitoring, source control measures, and source emissions predictions. A derived model is presented for predicting the performance of a simple burner or combustor from the standpoint of nitric oxide and carbon monoxide emissions; the associated program is simple, requires little disk storage, and is available on the Honeywell Computer Network in BASIC. The obtained CO emission predictions can be used to derive a boiler combustion control algorithm for optimizing thermal efficiency (assuming that stack combustibles are composed solely of CO and hydrogen), while minimizing NO formation within the constraints imposed by particular combustion system design. Maximum emission-levels and monitoring requirements are discussed for the above pollutants, as well as for sulfur dioxide and particulates.

42587 **APTIC NO. 62019**

Deschamps, Andre, Claude Dezael, Sigismond Franckowiack, and Philippe Renault

PROCESS FOR REMOVING SULFUR DIOXIDE FROM A GAS. *(Inst. Francais du Petrole des Carburants et Lubrifiants, Hauts-de-Seine, (France)) Brit. Pat. 1,333,897. 5p., Oct. 17, 1973. (Appl. March 6, 1972, 12 claims).*

A process for removing sulfur dioxide from a gas and producing a high purity elemental sulfur is described. The gas is contacted with ammonia and water at 30-80 C to obtain a solution of ammonia sulfite in which the molar ratio of water to SO2 is from 11:1 to 100:1. The solution is evaporated at a temperature below 100 C until the molar ratio is from 4:1 to 10:1. The resulting concentrated solution is heated to 105-200 C to produce a gaseous mixture of SO2, NH3, and steam. The gases are passed with hydrogen sulfide through a liquid phase consisting substantially of an organic solvent, as glycol, at a temperature of from 120 to 170 C to produce S. The S and a gaseous phase consisting substantially of steam and NH3 are separated from the liquid phase and the NH3 is recycled for reuse.

42588 **APTIC NO. 65974**

Dunlap, R. W., W. L. Gorr, and M. J. Massey

DESULFURIZATION OF COKE OVEN GAS: TECHNOLOGY, ECONOMICS, AND REGULATORY ACTIVITY. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 53-99, 1973. 24 refs.*

Coke oven gas, a by-product of the coking process, is a sulfur-containing fuel which, when burned, can be an important source of sulfur dioxide to the atmosphere. Stringent national air quality standards for SO2 has forced a reexamination of coke oven gas a clean fuel. This has been particularly true in locations such as Allegheny County, Pa., where concentrations of coke ovens produce a marked effect on SO2 air quality. The effect of coke oven gas combustion on ambient SO2 air quality is therefore reviewed. Results of air pollution diffusion models for Allegheny County are displayed and discussed. Coke oven gas desulfurization technology is reviewed; the vacuum carbonate process and the Stretford process for removal of hydrogen sulfide from coke oven gas are compared. The H2S recovered can be converted to elemental sulfur by the Claus process. The vacuum carbonate plant can give 90-93% removal efficiency; the Stretford process can give 99% removal efficiency with sulfur loadings from ppm to pph. The Stretford process converts H2S directly to elemental sulfur, so there are no secondary losses in efficiency, and steam demands are negligible. The costs of the two systems are compared, and conventional vacuum carbonate system costs at 86% efficiency are comparable to Stretford process costs at 98% efficiency. Coke oven gas desulfurization costs range from 2.5 to 3.75 cents/MSCF. Vacuum carbonate systems with net removal efficiencies greater than 86% have higher costs than the Stretford process. The promulgation of an enforceable SO2 emission regulation to regulate sulfur content of coke oven gas is also discussed. Current regulations, constraints on regulations, proposed emission standards for coke oven gas, and coke oven gas emission standard desulfurization requirements are discussed.

42589 **APTIC NO. 62257**

Fawley, Richard L.

REDUCING COAL EMISSIONS WITH OIL OR GAS. *Preprint, Purdue Univ., West Lafayette, Ind., 16p., 1973. (Presented at the Industrial Fuel Conference, West Lafayette, Ind., Oct. 3-4, 1973.)*

An auxiliary burner is described to be fired simultaneously with the stoker in a boiler, to supply a sufficient quantity of low emission fuel to the most economical quantity of high emission fuel, and to achieve a total BTU input within the emission limits of particulate matter to comply with the local codes. Simultaneous multi-fuel firing has been used for many years. Past attempts are described, fuels are discussed, and the burner operation is reviewed.

42590 **APTIC NO. 60979**

Ferm, Bo. Ch.

PROBLEMS OF FLUE GAS CLEANING. PART 2. *(Problem vid rokgasrening. Del 2). Text in Swedish. Kem. Tidskr., 85(12):64-66, Dec. 1973.*

Cascade scrubbers and the use of calcia and calcium carbonate as an absorbent for the removal of sulfur dioxide and other gases from waste gases are described. The kinetic energy of the gas to be cleaned is used for the atomization of the wash liquid in such a manner that the gas is blown into the scrubber bath through a central pipe, after which the flow rises to be diverted by a baffle. Due to the use of high flow rates, the hold time in the cascade scrubber is below 0.3 sec, which is especially suitable for the selective absorption of such gases as SO2 and fluorine without absorption of carbon dioxide and oxygen. For corrosive media, a cascade scrubber of simplified geometry, composed of columns with diverting surfaces and a droplet separator, is used. Corrosion and incrustation are prevented in such scrubbers by wetting the scrubber surfaces with the absorbent. Calcia and calcium carbonate in slurry form are used for the absorption of SO2 in flue gases in combination with dust separation. The absorption process is intensified by the continuous exchange between solid- and liquid-phase Ca ions, and a special mill provides for comminution of the calcia particles for added absorption.

42591 **APTIC NO. 62901**

Gerstmann, Joseph and Francesco Pompei

PERFORMANCE OF A HOMOGENEOUS COMBUSTOR FOR A RANKINE CYCLE STEAM ENGINE. *Preprint, Society of Automotive Engineers, Inc., New York, 10p., 1973. 7 refs. (Presented at the Society of Automotive Engineers, Combined Commercial Vehicle Engineering and Operations and Powerplant Meetings, Chicago, Ill., June 18-22, 1973, Paper 730671.)*

A compact gasoline-fired homogeneous combustor was developed for use in a Rankine cycle steam generator. The combustor takes advantage of staged cooling of the combustion products to limit the formation of nitric oxide while promoting the oxidation of carbon monoxide. The principles of operation and some of the design details of the burner are described. Steady-state emissions measurements are presented, and the performance of the staged quenching is compared with its predicted performance. Emissions of nitrogen oxides, hydrocarbons, and carbon monoxide were less than the 1976 standards. Figures are presented showing emissions as a function of firing rates and excess air. (Author abstract modified)

42592 **APTIC NO. 54133**

Harris, D. Bruce and Dennis C. Drehmel

FRACTIONAL EFFICIENCY OF METAL FUME CONTROL AS DETERMINED BY BRINK IMPACTOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 27p., 1973. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 66th, Chicago, Ill., June 24-28, 1973, Paper 73-324.)*

Data on the fractional efficiency of metal fume control was determined using the Brink impactor. The Brink impactor is a cascade impactor using a single orifice between stages. The control devices tested were a single-stage wet precipitator operating on a zinc roaster off gas; a two-stage wet precipitator on a copper converter off gas; a dry precipitator operating on a Zn sintering machine off gas; a baghouse operating on a lead sintering machine effluent gas; a baghouse operating on a blast furnace effluent gas. Fractional efficiencies for the wet electrostatic precipitators were generally good for particles with diameters greater than 0.38 micron. The dry electrostatic precipitator performed well only on particles greater than 3.1 micron. The baghouses gave better than 99% removal efficiency at all sizes including the less than 0.38 micron diameter range. (Author abstract modified)

42593 **APTIC NO. 66560**

Koehler, George R.

NEW ENGLAND SO2 RECOVERY PROJECT SYSTEM PERFORMANCE. *Preprint, American Inst. of Chemical Engineers, New York, 43p., 1973. 8 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 66th, Philadelphia, Pa., Nov. 11-15, 1973, Paper 21d.)*

System operation and performance are described for the New England Sulfur Dioxide Control Project, a full size, prototype pollution abatement system designed to control SO2 emissions from a 150 MW generating station powered by a high sulfur fuel oil fired boiler. The SO2 is recovered for production of 98% sulfuric acid. The process utilizes the SO2 absorption characteristics of an aqueous slurry containing magnesium oxide, magnesium sulfite, and magnesium sulfate, i.e., the Chemico-Basic s Magnesia System. Removal efficiencies of 90% are obtained for a fuel oil containing 2.5% S, and the system operates satisfactorily with SO2 concentrations in the outlet flue gas of 90 ppm or less. No significant scaling or plugging in the venturi absorber is encountered despite almost continuous operation.

42594 **APTIC NO. 66289**

Krippene, B. C.

NITRIC OXIDE REDUCTION THROUGH CONTROLLED COMBUSTION - A CHALLENGE TO THE BOILER DESIGNER. *Preprint, Instrument Society of America, Pittsburgh, Pa., 11p., 1973. (Presented at the National Power Instrumentation Symposium, 16th, Chicago, Ill., May 23-25, 1973.)*

Boiler design considerations for limiting nitrogen oxide emissions are discussed for natural gas, oil, and pulverized coal fired boilers. Design measures for the control of NOx include: two-stage combustion, burner elements designed for optimum and individual flame stability and adjustable to achieve the best burner performance, proper oil burner atomizer design to allow for changing the burner flame shape if desired, good control of fuel and air flow to individual coal burners, recirculation of flue gases, proper depth of the furnace combustion zone and proper distance of the burners from side and division walls, and the establishment of burner control systems on a per pulverizer basis rather than on a per burner basis.

42595 **APTIC NO. 66334**

Medvedev, I. and E. Muslin

AND WHAT IF WE WERE TO SWITCH TO HYDROGEN? *Izobret. Ratsion., no. 318:40-44, 1973. Translated from Russian by A. D. Cernicek, Los Alamos Scientific Lab., Los Alamos, N. Mex., 25p.*

NTIS: LA-TR-73-40

The use of hydrogen as a fuel in motor vehicles is discussed. There would be no exhaust pollutants since only water vapor is formed as a result of H2 burning, although high temperatures may lead to the formation of nitrogen oxides. The three most promising variants are the direct injection engine, the Stirling internal combustion engine, and a fuel cell electric motor. There are very few discharges of NOx with the direct injection engine. The Stirling engine has a thermal efficiency of 40%. Its mechanical characteristics are excellent although it is slightly heavier and more expensive than a similar diesel engine. External combustion permits using flameless catalytic burners which do not produce NOx.

42596 **APTIC NO. 66465**

Papathakos, Leonidas C. and Robert E. Jones

USE OF AN AIR-ASSISTED FUEL NOZZLE TO REDUCE IDLE EMISSIONS OF A JT8D ENGINE COMBUSTOR. *National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center, Rept. NASA-TM X-2946, E-7580, Work Unit 501-24, 10p., Nov. 1973. 3 refs.*

The effect of an air-assist nozzle on reducing exhaust emissions was evaluated by tests at typical engine idle conditions on a single-can JT8D combustor installed in a 24 cm housing. Injecting high-pressure air through the secondary-flow passage of a standard duplex fuel nozzle reduced hydrocarbon emissions from 840 ppm to 95 ppm and carbon monoxide emissions from 873 ppm to 258 ppm. Nitrogen oxides emissions increased slightly from 19 ppm to 22 ppm. An air-assist differential pressure of only 20.1 newtons/sq cm and an airflow rate of only 0.22% of the total combustor airflow was required. (Author abstract modified)

42597 **APTIC NO. 62749**

Plungis, Donald

EVALUATION OF AN AMC GREMLIN INCORPORATING PETERMAN MODIFICATION. *Environmental Protection Agency, Washington, D. C., Emission Control Technology Div., Rept. 74-16, DWP, 5p., Nov. 1973.*

The evaluation of an AMC Gremlin using the Peterman modification control system is described. The system includes a carburetor air bleed and modification of the distributor vacuum advance. The bleed system allows for better distribution of the fuel as it passes the throttle plate. The distributor modification included reversing the vacuum advance so that a vacuum retard was affected. The 1975 interim emission levels were achieved with this vehicle modification. There were two potential driveability problems noted with the modification: the vehicle demonstrated surge and knock.

42598 **APTIC NO. 61626**

Reis, T.

SULFUR REMOVAL BY FUEL AND FLUE GAS DESULFURIZATION. *(Elimination du soufre par desulfuration des combustibles et des fumees). Text in French. Ind. Petrole, no. 41:51-57, 1973.*

General and economic aspects of the desulfurization of fuel oils and their combustion gases are discussed. Direct hydrodesulfurization, and indirect desulfurization, including cracking and gasification, are among the most advanced techniques for oil desulfurization. The specific cost of these processes ranges from about $160 to $360/ton of sulfur removed. Adsorption of sulfur dioxide by inorganic solids, solutions, suspensions, organic solutions, oxidation, and various processes for sulfur recovery in the form of elemental sulfur, concentrated SO2, or sulfuric acid have been proposed for gas desulfurization in large-capacity combustion equipment. The specific cost of flue gas desulfurization without sulfur recovery and utilization amounts to about $188/ton of sulfur removed.

42599 **APTIC NO. 62237**

Schmidt, H. W.

COMBUSTION IN A CIRCULATING FLUID BED. *Environmental Protection Agency, Washington, D. C., Control Systems Lab., Proc. Int. Conf. Fluid. Bed Combust., 3rd, 1973, p. II-1-1 to II-1-14, EPA-650/2-73-053. 6 refs. (Dec.)*

NTIS: PB 231977/AS

In a pilot plant for the calcination of alumina according to the circulating fluidized bed method, the combustion process was studied experimentally. Since high gas velocities occurred in the circulating fluidized bed, the retention times of the combustion gases were short during direct combustion in the fluidized bed. By a suitable division of the primary and secondary combustion air flows, it was possible to increase the radial mixing and to substantially speed up the combustion of the fuel components. It was thus possible to increase the specific throughput capacity by raising the gas rate. During the tests, deposits of unburned carbon were observed on the alumina in the lower furnace section. Consequently, the endothermic process can only be performed according to the principle of a circulating fluidized bed since the carbon is not completely burned until the fuel reaches the furnace top. (Author summary)

42600 **APTIC NO. 62226**

Squires, A. M.

CLEAN FUEL TECHNOLOGY GAP: OPPORTUNITIES FOR NEW FLUIDIZATION PROCEDURES. *Environmental Protection Agency, Washington, D. C., Control Systems Lab., Proc. Int. Conf. Fluid. Bed Combust., 3rd, 1973, p. 0-3-1 to 0-3-13, EPA-650/2-73-053. (Dec.)*

NTIS: PB 231977/AS

Since fuel demand is increasing, pollution control regulations are becoming more strict, and domestic and imported fuel supplies are limited, new procedures are necessary to produce clean fuels. Many companies have reduced fuel research and development efforts due to increased costs. It is possible that substitutes for oil and fuel will be developed too late, oil production will reach its limit, and economic problems will arise. Gasification of coal, nuclear power, and other fuel sources may be able to alleviate the fuel crisis. However it is too late to prepare for the world clean fuel crisis if it should appear by 1985, and there is barely time to prepare for a crisis in 2000. It will soon become profitable to collect hydrogen and other products of coal or oil combustion. New techniques will enable coal and residual oil to be gasified to produce power gas. Fluidized bed gasification of coal and oil are reviewed. Treatment of raw coal with hydrogen at elevated pressure and at temperatures between 1500 and 1800 can result in attractive yields of methane at high concentration. This process could be used for a Coalplex yielding roughly 25% of the coal s heating value in the form of methane and perhaps 15-20% as BTX (benzene, toluene, and xylene), with the remainder being converted to electricity at an efficiency beyond 40%. A similar process could be applied to residual oil to produce more methane and BTX and less coke. The future of fossil fuel development is mentioned. The Department of Chemical Engineering of the City College of the City University of New York has nine studies in progress on power gas, Coalplex, and Oilplex.

42601 **APTIC NO. 53989**

Turner, James H.

PERFORMANCE OF NON-WOVEN NYLON FILTER BAGS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 34p., 1973. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 66th, Chicago, Ill., June 24-28, 1973, Paper 73-300.)*

Nonwoven nylon filter bags were evaluated. Bags made of spunbonded nylon 66 were tested in a single bag baghouses at fly ash grain loadings of 1.5 to 3.0 grains/cu ft, air to cloth ratios of 4.3 to 8.7, and relative humidities of 20 to 40%. Results showed increased filtration efficiency with increased fabric weight. Compared to woven nylon of the same weight (4 oz/sq yd), spunbonded nylon was more efficient (99.89 versus 95.02%), produced lower specific cake resistance (4.5 versus 7.6 (in. water/fpm)/(lbs/sq ft)), and had slightly higher effective drag (0.29 versus 0.23 in. H2O/fpm). Endurance for a 5.9 oz/sq yd bag was over 6 million shakes. Spunbonded bag costs are estimated to be 70% of woven bag costs. Spunbonded nylon bags have higher efficiency, lower outlet concentration, lower specific cake resistance, and approximately equal effective drag when compared with woven nylon of the same weight. The heaviest bag tested will withstand shake cleaning in excess of 6 million shakes. Assuming endurnace is sufficiently good, spunbonded nylon filter bags provide lower cost filtration when compared to woven nylon bags. (Author abstract modified)

42602 **APTIC NO. 66484**

Verlo, Clayton C.

POLLUTION ABATEMENT IN PRINTING PLANTS: THE METHODS AND COSTS. *Am Ink Maker, 51(2):12-13, 16, 18-21, 54, Feb. 1973. (Presented at the National Printing Ink Research Institute, Lehigh University, Oct. 25, 1972.)*

The methods and costs of abating pollution in printing plants are discussed. Colored plumes of vaporized hydrocarbons are highly visible sources of air pollution. Federal law stipulate maximum quantities allowable from each source, effluent standards are enforced by the states. Incineration is the most discussed method, but it is costly. Operating costs come to $15,500/yr/press. Operating costs will run $7.50/cfm installed, including a four pass heat exchanger. Solvent recovery is another option. There are companies which make pre-engineered and pre-piped solvent recovery units for toluene, acetone, trichloroethylene, perchloroethylene, and hexane. Most regulatory agencies require proof that the stacks are clean. There are precise procedures for taking and analyzing samples of stack effluent. The cost may run from $1000 to $5000 depending on the number of samples that must be taken and the number of different components that must be analyzed.

42603 **APTIC NO. 65978**

Weber, Ekkehard

TREATMENT OF WASTE GASES FROM THE BASIC OXYGEN FURNACE IN WEST GERMANY. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 225-247, 1973. 14 refs.*

The use of oxygen steelmaking processes such as basic oxygen furnaces (BOF) has led to a very marked increase in productivity. However, it has also led to the emission of a considerable amount of dusts in the waste gases. A number of processes to purify the waste gas have been developed, including one in which the waste heat is recovered and reused. The amount of waste gas and the dust composition from BOF are reviewed. Dust separation processes are discussed including scrubbers, combined systems (saturators with electro filters), and electro filters. Disintegrator and venturi scrubbers are often used for dust removal because of their high efficiency.

42604 **APTIC NO. 61945**

Westlin, Karl L.

IMPROVED DUST COLLECTOR APPARATUS. *(American Air Filter Co., Inc., Louisville, Ky.) Brit. Pat. 1,328,844. 4p., Sept. 5, 1973. (Appl. Sept. 30, 1970, 11 claims).*

A dust collector device for separating contaminant particles from a dirty gas stream is described. It consists of an inlet plenum having a dirty gas inlet and a dirty gas outlet. There is a deflector in the region of the outlet of the inlet plenum for deflecting, in substantially the reverse direction, the gas stream issuing from the outlet of the inlet plenum. The gas stream is passed into a louvered dirty gas cleaning plenum(s) and is reversed by passing through the louvers into the original direction. The device is economical in both construction and operation and permits quick installation in a flow through conduit system. It allows minimum kinetic energy losses in the gas stream treated.

42605 **APTIC NO. 66445**

Woods, Robert L.

A STUDY OF OPTIMUM ENGINE SCHEDULING AND ITS APPLICATION TO FLUIDIC FUEL INJECTION. *U. S. Army Materiel Command, Washington, D. C., Harry Diamond Lab., Proj. DA-1T061102A33B, AMCMS Code 611102.11, HDL Proj. 302331, Rept. HDL-TM-72-31, 62p., Aug. 1973. 9 refs.*

A method of determining the true optimum air-fuel requirements of a spark-ignition internal combustion engine is described for use in a fluidic fuel-injection system which combines the simplicity of carburetor type systems and the functional characteristics of complex fuel injection systems, including the reduction of pollutant emissions. Data taken during engine dynamometer runs indicate that the true optimum air-fuel ratios are about 10% leaner than normally thought. A fluidic fuel system is described in which the operator selects fuel consumptin directly and the control system selects the prescheduled optimum air consumption. The scheduling and control system is applicable to either continuous or pulsed fuel-injection systems.

42606 **APTIC NO. 63342**

Yamada, Kiichi

DEVICE FOR REMOVING NOXIOUS SUBSTANCES DISCHARGED FROM CHIMNEYS. *(Assignee not given.) U. S. Pat. 3,779,709. 8p., Dec. 18, 1973. 3 refs. (Appl. Feb. 22, 1972, 6 claims).*

A device for removing noxious substances discharged from chimneys is described, including a pair of filter units disposed in each of two flues defined in the chimney, so as to be selectively put into service by a flip-over vane. Each flue has two filter sections: a first section where a viscous fluid cleanser for dust and other particles of the discharge is intermittently sprayed unto a porous filter disposed therein when the flue is in use, while a washing liquid is sprayed onto the filler for washing the particles away from the filter along with the liquid cleanser when the flue is not in use; in a second portion a neutralizer is sprayed to the porous filler disposed therein for neutralizing acidic or basic components of the discharge when the flue is in use. Staggered V-shaped troughs are provided below each section to catch liquid draining from the respective fillers for recirculation while permitting flow of flue gas up the chimney.

42607 **APTIC NO. 61949**

(Inventor not given.)

IMPROVEMENTS IN OR RELATING TO THE TREATMENT OF EXHAUST GASES. *(Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo, (Japan)) Brit. Pat. 1,326,602. 3p., Aug. 15, 1973. (Appl. Aug. 27, 1970, 12 claims).*

A catalytic structure for use in treating exhaust gases from the combustion engines of automobiles is described. The structure contains a catalyst active to purify internal combustion engine exhaust gases supported on a porous net like sheet made from yarns of heat resistant glass, each yarn comprising from 200 to 10,000 filaments each having a diameter of from 3 to 40 micron. The porous net like sheet has a mesh size of from 3.5 to 60, preferably from 8 to 32 mesh. The catalyst may be an oxide mixture which comprises an oxide of a transition metal, for example, nickel or cobalt, and an oxide of a metal which forms an acidic oxide, for example, chromium or manganese.

42608 **APTIC NO. 62025**

Inventor not given

PRODUCTION OF GYPSUM FROM COMBUSTION EXHAUST GAS. *(Kuhera Kagaku Kogyo Kabushiki Kaisha, Tokyo, (Japan)) Brit. Pat. 1,334,185. 4p., Oct. 17, 1973. (Appl. Oct. 26, 1971, 3 claims).*

An improved method of producing gypsum from combustion exhaust gas from plants and factories without causing clogging of the absorption tower is described. High temperature combustion exhaust gas is introduced into an absorption tower in which the temperature is first lowered to between 180 and 150 degrees and subsequently to 95 to 80 C by contacting the gas with water. The relative humidity is simultaneously adjusted from 15% to 60%. The treated gas is contacted with a solution of an alkali metal sulfite to absorb and fix sulfur dioxide in the exhaust gas in the form of a solution of alkali metal sulfite and alkali metal bisulfite. Simultaneously, the solution is concentrated by reacting the alkali metal bisulfite in the solution with calcium carbonate or calcium hydroxide to produce crystals of calcium sulfite and alkali metal sulfite. The CaSO3 is separated from the alkali metal sulfite solution and washed, slurried, and contacted with a small quantity of air to oxidize the CaSO3 into gypsum. The alkali metal sulfite solution and water used for washing the CaSO3 are recycled.

42609 **APTIC NO. 64526**

(Inventor not given.)

PROCESS AND APPARATUS FOR THE CONTROL OF HYDROCARBON VAPOUR EMISSIONS FROM A FUEL SYSTEM. *(Ford Motor Co. Ltd., London (England)) Brit. Pat. 1,341,052. 3p., Dec. 19, 1973. (Appl. May 25, 1971, 14 claims).*

A process and apparatus for the control of evaporative emissions from hydrocarbon fuel systems is described which relies upon the permeability of certain plastics to gasoline vapors. The hydrocarbon vapors are vented through a conduit permeable to hydrocarbon vapor and containing a hydrocarbon absorbent or adsorbent. The plastic conduit which is itself an absorbent for hydrocarbon vapors tends to remove hydrocarbon vapors both as they escape from the fuel container and to abstract from the adsorbent or absorbent granules hydrocarbon vapor adsorbed or absorbed thereon. The outer surface of the tube is exposed to a flow of pure air which flushes the outer layer of the tube essentially free of absorbed hydrocarbons and establishes a driving force tending to cause the gasoline adsorbed or absorbed on the granular material in the tube to move to the inner surface of the tube, through the wall of the tube, and into the air intake stream for combustion in the engine.

42610 . **APTIC NO. 66221**

THE ENVIRONMENT AND THE QUALITY OF LIFE. *(Medio ambiente y la qualidad de la vida). Text in Spanish. Dyna (Madrid), 12(48): 553-557, Dec. 1973. (Conferencia pronunciada en la semana hispano-francesca de lucha contra la contaminacion, Madrid, Spain, 7-11 de Mayo de 1973.)*

An ecological overview of the effects of industry and urbanization on the environment is presented. Technical solutions available for the abatement of air pollutant emissions are fuel desulfurization, retention of particulate matter in flue gases, and dispersion of toxic and harmful emissions by high stacks. Urban air pollution, a result of domestic heating, industry and automobile traffic, can be abated by the use of low-sulfur or desulfurized fuel oil, and by remote heating systems.

42611 **APTIC NO. 66282**

(Inventor not given.)

A COOLER FOR DUST-LADEN AIR OR GASES. *(Standard Filterbeau-GmbH, Muenster/Westfalia (West Germany)) Brit. Pat. 1,336,820. 5p., Nov. 14, 1973. (Appl. March 15, 1972, 7 claims).*

A cooler for dust laden air or gases which provides for uniform distribution of the hot gases and cool air is described. The cooler consists of side by side heat exchangers. The deflection of the gases through a 360 degree angle provides for a satisfactory distribution of the gases during their passage through the cooler and also enables some of the dust contained in the gases to be precipitated in two collecting chambers at the bottom. The uniform distribution of gases and cool air is an improvement over other coolers in which the temperature may fall below the dew point and produce crustations in the cooler.

42612 **APTIC NO. 66290**

National Academy of Sciences, Panel on Manufacturability and Producibility

APPENDIXES TO THE REPORT ON MANUFACTURABILITY AND COSTS OF PROPOSED LOW-EMISSION ENGINE SYSTEM (FINAL REPORT). *144p., Jan. 1973.*

Appendices to a report on manufacturability and costs of proposed low-emission engine systems are presented as backup documents containing information essential to the report. The appendices cover meetings of the National Academy of Sciences Panel on Manufacturability and Producibility, extracts from a status report, the Panel s work statement for 1972, an interim status report, an estimate of lead time for catalyst manufacture, the status of liquefied gas substitutes for gasoline, reports of visits to American diesel manufacturers, a report for a Panel visit to Europe, the status of Wankel engine development at General Motors, reports of panel revisits to American automobile companies, and computer simulation of a hypothetical automotive implementation plan.

1972

42613 **APTIC NO. 60992**

Agudo, A. Lopez

MOTOR VEHICLE EXHAUST-GENERATED AIR POLLUTION AND EXHAUST CONTROL SYSTEMS. *(La contaminacion producida por los vehiculos de motor y los sistemas para su control). Text in Spanish. Ion (Madrid), vol. 33:502-507, Sept. 1972. 16 refs.*

A summary of the various types of control systems being developed to control automotive pollution is presented. Recirculation systems, thermal reactors, and catalytic convertors are discussed. New types of motors include the Wankel, the Stirling, and the turbine. The Wankel rotary model presents the problems related to the hermetic seal which must exist between the rotor and the motor chamber, and the turbine and Stirling types form nitrogen oxide due to higher internal temperatures. These new motors all have the advantage of using low octane gasoline, although the higher temperatures have problems with material resistance. Recirculation systems that cut NO emissions up to 60% are viewed as a partial solution only, since these systems diminish the power of the motor. Thermal reactors, the simplest devices, are not versatile enough. Catalytic convertors are viewed as the best auto pollution control system. They eliminate carbon monoxide, hydrocarbons, and NO. The primary difficulty is lead elimination, unless the gasoline is low in octane. Secondly, two types of different chemical reactions must take place in one converter. Initial results are favorable for this type of device with two catalysts.

42614 **APTIC NO. 66456**

Bartok, W., A. R. Crawford, and G. J. Piegari

SYSTEMATIC INVESTIGATION OF NITROGEN OXIDE EMISSIONS AND COMBUSTION CONTROL METHODS FOR POWER PLANT BOILERS. *AIChE Symp. Ser., 68(126):66-74, 1972. 6 refs.*

The control of nitrogen oxide emissions from power plant boilers was investigated using combustion control methods. A test program was conducted on a 180 MW, front wall, gas fired boiler. Nitrogen oxides emissions decreased sharply with reduced boiler load, particularly under normal firing. Lowering excess air reduces NOx but not as effectively as operation with staged firing. Staged firing combined with low excess air is particularly effective at full load. Compared with a baseline NOx emission level of 390 ppm, the combination of staged combustion and low excess air produced at 60% reduction at full load (156 ppm) and a 70% reduction to 116 ppm by reducing the load by 61% to 70 MW. The major problem areas for controlling emission from coal fired boilers are slagging, steam temperature control, corrosion, flame stability, and flame impingement, high combustible emission, and safety problems. (Author abstract modified)

42615 **APTIC NO. 66459**

Belding, John

THE HIGH SULFUR COMBUSTOR. *AIChE Symp. Ser., 68(126):175-180, 1972. 7 refs.*

Processes associated with a study on the feasibility of recovering salable products from the high ash, high sulfur, carbonaceous reject fraction from deep cleaning of coal are discussed. The pyritic sulfur content of some bituminous coals may be reduced by gravimetric separation or washing. No single process is capable of efficient recovery of SO2 at all concentrations in the range 0.5 to 6.0%. Higher concentrations are best treated by direct catalytic oxidation for recovery of commercial grade 98% acid. The magnesium oxide/magnesium sulfite cycle is appropriate for the range of SO2 below 4% down to 1%. Under favorable conditions the revenue from extraction and sale of heat and sulfur value contained in the reject fraction of coal washing may to some degree offset the cost of washing. (Author abstract modified)

42616 **APTIC NO. 66345**

Cross, Frank L., Jr.

A DESIGN FOR INDUSTRIAL SOLID WASTE INCINERATION-AIR POLLUTION CONTROL CONSIDERATIONS. *Preprint, American Inst. of Chemical Engineers, New York, 15p., 1972. (Presented at the American Institute of Chemical Engineers, Midland Workshop Industrial Process Design for Pollution Control, Nov. 1-2, 1972.)*

The air pollution control considerations required for an incinerator to burn industrial solid waste are discussed. Principal incinerator emissions are visible emissions, particulates, and odors. High energy scrubbers (venturi) and electrostatic precipitators are the only practical particulate controls systems that will meet today s stringent standards which require a collection efficiency of better than 95%. A number of sampling systems were designed and developed for source testing. Isokinetic sampling has a significant influence on the type of equipment used in source testing. It is important in obtaining representative results in collection of particles larger than 5 micron in diameter.

42617 **APTIC NO. 66513**

Ehrlich, Shelton, Ernest B. Robison, John S. Gordon, and John W. Bishop

DEVELOPMENT OF A FLUIDIZED-BED BOILER. *AIChE Symp. Ser., 68(126):231-240, 1972. 2 refs.*

The air pollution reduction capability of the Pope-Bishop fluidized bed boiler is discussed. The development of the boiler is described including earlier and unsuccessful attempts. Over 90% of the sulfur in coal or oil can be retained in a fluidized bed of limestone sorbent if the S content of the bed is kept low by rapid replacement with fresh or regenerated sorbent. In the absence of sorbent, the S emission is substantially unaffected by changes in the operting variables. The nitric oxide emission responded only to changes in the oxygen content in the flue gas. The average concentration of a test series conducted at 3% O2 was 275 ppm. The concentration of hydrocarbons was reduced sharply when excess air was increased. Hydrocarbon burnup was essentially complete at 24% excess air in flue gas. Particulate emissions are a function of the cyclone collector efficiency. A low pressure drop mechanical collection is capable of removing about 90% of the fly ash.

42618 **APTIC NO. 66510**

Fornoff, L. L.

A NEW MOLECULAR SIEVE PROCESS FOR NOX REMOVAL AND RECOVERY FROM NITRIC ACID PLANT TAIL GAS. *AIChE Symp. Ser., 68(126):111-114, 1972.*

A molecular sieve system was developed to remove and recover nitrogen oxides from the tail gas of a nitric acid plant. This system is capable of providing an NOx effluent concentration of less than 10 ppm which is far below that which can be achieved with other known commercial systems. The treating costs are 20% less than the treating costs for a catalytic reduction system. The capital investment costs are 28% higher than the capital investment costs for a catalytic reduction system. The PuraSiv N System uses a unique molecular sieve adsorbent/catalyst which was developed to provide a long life in this application. The system: recovers the NOx and recycles it resulting in a 2 1/2% yield increase; operates at low temperatures (600 F); provides dry tail gas containing less than 10 ppm vol NOx and no unburned hydrocarbons of carbon monoxide; eliminates the effect of oxygen; and reduces energy requirements. (Author conclusions modified)

42619 **APTIC NO. 66544**

Gleason, R. J. and J. D. McKenna

SCRUBBING OF SULFUR DIOXIDE FROM A POWER PLANT FLUE GAS. *AIChE Symp. Ser., 68(126):119-131, 1972. 15 refs.*

The control of sulfur dioxide emissions from a coal fired power generating boiler using a flooded disk venturi scrubber in series with a packed power was investigated on a 1000 cu ft/min pilot scale system. Lime scrubbing of SO2 in a flooded disk scrubber provides 50-55% SO2 removal if a pressure differential across the disk of 15 to 20 in. of water is provided. The scrubber and packed tower scaled severely with quicklime absorbate. Packed tower SO2 absorption with quicklime, limestone, and soda ash was measured at 99, 90, and 98%, respectively, at approximately the same operating conditions. Deposition of the reaction products in the irrigated areas of the tower was significantly reduced by high liquid-to-gas ratio, a high reaction product slurry concentration, and desupersaturation of the slurry prior to recycle. The system is improved by a unique fixed bed wetted-wall type packing which has low pressure drop characteristics and a relatively high surface area (68 sq ft/cu ft). (Author abstract modified)

42620 **APTIC NO. 66543**

Gloger, J. and W. Lukas

STUDY OF THE SEPARATION EFFICIENCY OF CENTRIFUGAL SEPARATORS WITH BOUNDARY LAYER CONTROL. *(Untersuchung des Abscheidegrads von Fliehkraftabscheidern bei Verwendung einer Grenzschichtabsaugung). Text in German. Luft Kaeltetech., 8(6):291-295, 1972. 20 refs.*

The effect of boundary layer control, i.e., suction of the boundary layer of dust formed on the cyclone wall through a vertical slot in the cyclone casing, on the dust separation efficiency of cyclones was studied in a model experiment with different types of dust. The suction of the boundary layer, especially through the middle and lower sections of the vertical slot, effectively increased the dust separation efficiency at negligible pressure loss and negligible interference by the suction slot with the flow process inside the cyclone. The use of boundary layer control resulted in an increase by at least 2%, e.g., from 96 to 98%, in the dust separation efficiency.

42621 **APTIC NO. 66452**

Hammons, G. A. and A. Skopp

A REGENERATIVE LIMESTONE PROCESS FOR FLUIDIZED BED COAL COMBUSTION AND DESULFURIZATION. *AIChE Symp. Ser., 68(126):252-257, 1972. 5 refs.*

The combustion and flue gas desulfurization efficiences from a limestone bed are reported as a function of the operating variables of the system. The small diameter of the combustor caused the gas-solid contacting efficiency to decrease as bed height was increased. This resulted in poorer desulfurization efficiency as bed depth was increased. Nitrogen oxides emissions decreased as a combustion run progressed (and simultaneously as the sulfur dioxide concentration in the batch reactor increased) indicating an interaction between SO2 and NOx. The limestone maintained a relatively high capacity for SO2 over numerous cycles of combustion and high temperature reductive regeneration. The cyclic deactivation of the stone was dependent on the quantity of coal fly ash retained in the bed. The cyclic stone deactivation data were used to calculate limestone feed rated required in a continuous circulating system for 90% SO2 removal. (Author abstract modified)

42622 **APTIC NO. 66338**

Harrington, R. E.

SULFUR DIOXIDE REMOVAL FROM WASTE GASES: A STATUS REPORT. UNITED STATES: RECOVERY PROCESSES. *Society of Engineering Science, Pollut. Eng. Sci., Solutions, Proc. Int. Meet., Soc. Eng. Sci., 1st, Tel Aviv, Israel, 1972, p. 224-234, 1973. (June 12-17.)*

Various recovery-type flue gas desulfurization processes currently being developed are reviewed. Processes considered include: magnesium oxide scrubbing, catalytic oxidation, the Wellman-Lord process of sulfur dioxide absorption, the sodium citrate process, ammonium scrubbing, Universal Oil Products Corporation s Sulfoxel process, double alkali scrubbing, molten carbonate scrubbing, the char sorption process, potassium formate scrubbing, metal oxide sorption, and the Stone and Webster/Ionics process. A brief description of each process is given along with preliminary testing results. Most of the processes are in the early stages of development or demonstration.

42623 **APTIC NO. 66451**

Harvin, Richard L.

A MODERN DESIGN SOLVENT RECOVERY PLANT. *AIChE Symp. Ser., 68(126):302-306, 1972.*

The design of a 240,000 CFM solvent recovery plant built for Standard Gravure Corp., Louisville, Ky., is discussed. The plant is designed to remove 98% of the hydrocarbon solvents from the gravure oven exhausts. Approximately 2 MM gal/yr of solvents are recovered and reused with no further treatment. The plant incorporates the new C and I/Girdler adsorber design, fully automatic control instrumentation to obtain the highest steam efficiency, and analog computer optimization. (Author abstract modified)

42624 **APTIC NO. 66454**

Hoy, H. R. and A. G. Roberts

FLUIDIZED COMBUSTION OF COAL AT HIGH PRESSURES. *AIChE Symp. Ser., 68(126):225-230, 1972. 3 refs.*

The advantages of burning coal at pressures of several atmospheres in a fluidized bed are outlined. A pilot scale combustor operating at 5 atmospheres, 1500 F, and 2 ft/sec superficial fluidizing velocity obtained a 97-99.5% combustion efficiency. High heat transfer coefficients and low sulfur emissions (less than 100 ppm sulfur dioxide when dolomite was added to the bed) occurred. Oxides of nitrogen emissions were in the range 50-200 ppm. Negligible deposition and no erosion occurred on a static cascade of turbine blades exposed for several hundred hours to the high velocity combustion gases. The potential for using the gases to power large gas turbines with the without a steam cycle is discussed. (Author abstract modified)

42625 **APTIC NO. 66288**

James, D. E.

NITRIC OXIDE CONTROL FOR OIL AND GAS FIRED UTILITY BOILERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1972. (Presented at the Air Pollution Control Association Meeting, Houston, Tex., April 13, 1972, Paper PGT072-24.)*

Design considerations in reducing the formation of nitric oxide in oil and gas fired utility boilers are reviewed. Anything that limits the peak flame temperature, the time available, or the amount of oxygen present in the active combustion zone results in a reduction of NO formation. Five methods presented for reducing NO formation are: modification of the burning equipment so that fuel and air mix at a slower rate, reduction of the combustion air temperature, two-stage combustion, flue gas recirculation, and the combination of flue gas recirculation and two-stage combustion. More information is required to determine the limits of two-stage combustion while firing oil since present information indicates that with certain fuel oils it is not possible to reduce the O2 concentration in the primary combustion zone to the low levels possible with natural gas.

42626 **APTIC NO. 66519**

Kapo, George

STACK DESULFURIZATION AND VANADIUM PENTOXIDE FLY ASH RECOVERY FROM FLUE GAS PRODUCED FROM VENEZUELAN RESIDUUMS. *AIChE Symp. Ser., 68(126):147-154, 1972. 37 refs.*

An optimum process for the desulfurization of stack gases and recovery of vanadium pentoxide fly ash produced from burning Venezuelan residuums is discussed. The fly ash is worth more than the sulfur by-product and there is substantial conversion to sulfur trioxide. Published stack desulfurization processes are not the most appropriate if directly applied. Eight proposed stack desulfurization-devanadiazation processes are described. The most effective would be a wet scrubber process with a vanadium refinery using a fluidized bed converter with recycled V2O5; a floating bed absorber would simultaneously remove all the SO3 and fly ash and some of the nitrogen oxides; the absorber would operate at 200 F and 0 pH. The vanadium would be recovered by either selective precipitation by pH adjustment, adsorption on activated carbon, or liquid-liquid extraction. This process is superior to the processes of Canada Petrofina and Monsanto because both the sulfuric acid needed to digest the fly ash and the catalyst to oxidize the SO2 are generated in situ.

42627 **APTIC NO. 66450**

Keairns, D. L., W. C. Yang, and D. H. Archer

DESIGN OF A FLUIDIZED BED COMBUSTION BOILER FOR INDUSTRIAL STEAM GENERATION. *AIChE Symp. Ser., 68(126):259-266, 1972. 7 refs.*

The design and pollution control capabilities of a 250,000 lb/hr fluidized bed combustion boiler for industrial steam generation are described. The projected pollution control capability for nitrogen oxides, sulfur dioxide, and particulates is summarized. Nitrogen oxides emissions are in the range of 0.40 lb nitrogen dioxide/10 to the 6th power Btu to 0.80 lb NO2/10 to the 6th power Btu. Sulfur dioxide removal depends primarily on the amount of limestone fed and is expected to be greater than 90% for the one through dry solid system. For the wet scrubbing system, the SO2 removal efficiency is expected to be 85 to 90%. For a coal containing 4.3 wt% sulfur, the SO2 emission is in the range of 0.80 to 1.13 lb/10 to the 6th power Btu. Particulate loading in the flue gas is expected to be less than 0.1 lb/10 to the 6th power Btu.

42628 **APTIC NO. 64461**

Kostel, Paul Steven, William Earl Borgen, and Richard Joseph Willert

ELECTRONIC AIR PURIFIER. *(Assignee not given.) U. S. Pat. 3,685,258. 14p., Aug. 22, 1972. 4 refs. (Appl. Jan. 18, 1970, 31 claims).*

This invention relates to an electronic dust precipitator which is portable and small, for household or office, having numerous built-in features which improve the dust precipitation efficiency, the ease of operation including ease of cleaning, and the lifetime of rugged useful operation as well as overall safety of the device in use. It has a dust precipitating cell assembly of high voltage aligned plates and an ionizing wire secured at each cell side by polyacrylate polymer. The cell is manually insertable into a housing which supports a pair of spring contacts, one at each cell side, each to frictionally engage a group of plates of the same polarity when the cell is inserted to make the high voltage circuit through the cell and break the circuit when the cell is manually withdrawn for cleaning. The cell may be of numerous, closely spaced high voltage plates operated by a doubled circuit supplied at about 5000 volts DC produced by a doubler circuit encased in plastic to further reduce arcing. (Author abstract)

42629 **APTIC NO. 66468**

Leith, David and William Licht

THE COLLECTION EFFICIENCY OF CYCLONE TYPE PARTICLE COLLECTORS-- A NEW THEORETICAL APPROACH. *AIChE Symp. Ser., 68(126):196-206, 1972. 22 refs.*

An appropriate average residence time for the gas in a cyclone was determined to derive a new equation for cyclone efficiency. It depended on three dimensionless parameters: C, a cyclone design number depending upon the physical shape, but not size; psi, a modified type of impaction parameter depending upon operating conditions; and n, the exponent in the modified form of the vortex law for tangential velocity distribution. It is possible to calculate all of these numbers for any proposed design and operation and thus predict grade efficiency relationships a priori. The new theoretical equation gives excellent agreement with published data. (Author abstract modified)

42630 **APTIC NO. 53783**

Lincoln, Roland L.

SPRAY NOZZLE FOR GAS SCRUBBERS. *(Assignee not given.) U. S. Pat. 3,692,244. 4p., Sept. 19, 1972. (Appl. April 22, 1970, 2 claims).*

A liquid spray nozzle which is particularly adapted for use with a gas scrubber is described. Unlike other nozzles, this nozzle can atomize unfiltered liquid at flow rates up to 200 gal/min and more without becoming plugged and can operate at either high or low pressure air. The interior of the nozzle consists of two tubes. The first tube is cone shaped and includes a longitudinal portion with a substantially constant cross sectional area from which an inlet conduit which connects to the source of liquid extends. A spray director is mounted to the first tube by an annular plate and threaded rods. The second tube is mounted concentrically with the first tube. A plate with a plurality of orifices opens and closes the second tube depending upon the pressure. The liquid enters the first tube and goes into the mixing chamber. Gas at elevated pressure enters through the second tube and goes into the mixing chamber. The mixture is forced out the spray director into the scrubber. (Author summary modified)

42631 **APTIC NO. 66467**

Mamoowala, M. B., T. A. Kitabi, D. D. Bendale, Jacob Verghese, P. A. Sharma, and R. L. Mehta

INDUSTRIAL DUST AND FUME CONTROL TO AVOID AIR POLLUTION. *Chem. Eng. World, 7(11):40-45, Nov. 1972.*

Methods for the control of industrial dusts and fumes are described. The cyclone or centrifugal separator which separates dust from the gases by mechanical (inertial) forces created by swirling is becoming outdated because it is only effective with particles of 20 micron size. The wet scrubber dust collector which relies on impingement is widely used where there is a secondary pollution problem of disposing dust in a dry state. It is also used in washing air contaminated with soluble gases like acid fumes and ammonia gas. Fabric bag filters intercept solid dust particles which cling to the fabric according to Vander Waal s laws and by electrostatic forces. A comparison of properties of various filter media is tabulated. The electrostatic precipitator ionizes the dust particles so they are attracted towards an anodic plate. The collector operates at a high efficiency up to sub-micron particle size.

42632 **APTIC NO. 66457**

Shah, I. S. and C. P. Quigley

MAGNESIUM BASE SO2 RECOVERY PROCESS: A PROTOTYPE INSTALLATION AT BOSTON EDISON COMPANY AND ESSEX CHEMICAL COMPANY. *AIChE Symp. Ser., 68(126):139-146, 1972.*

The application of the magnesium base sulfur dioxide recovery process in the desulfurization of fuel is described. Sulfur dioxide removal efficiency of 90% plus can be attained. The preliminary economics show a total owning cost of $0.80/barrel taking no credit for sulfuric acid produced, and a total cost of $0.58/barrel taking credit of $15/ton of acid for sulfuric acid produced. There are protype installations at Mystic Station of Boston Edison Co., Boston, Mass. and Essex Chemical Co. s sulfuric acid facility at Rumford, R. I. The installation in Boston will handle flue gases from a 155 MW generating station, burning 2.4% sulfur content fuel oil. The SO2 recovered is equivalent to 50 tons/day of 98% H2SO4 and will provide total feed to the sulfuric acid plant in Rumford. (Author summary modified)

42633 **APTIC NO. 66489**

Shooter, Douglas and Ashok Kalelkar

THE BENEFITS AND RISKS ASSOCIATED WITH GASEOUS FUELED VEHICLES. *Little (Arthur D.), Inc., Cambridge, Mass., Case 74400-2, 86p., May 5, 1972. 22 refs.*

The impact of conversion of gasoline-fueled motor vehicles to power by gaseous fuels is assessed in terms of improvement in air quality and possible risks associated with thhe use of gas fuels. Topics studied include: the technical feasibility of conversion to gaseous fuels, the economics of conversion, the availability of gaseous fuels, acceptable levels of risk, and conceivable hazards from gaseous fuels. The results of the study indicate that conversion to gaseous fuel operation will reduce exhaust emissions to levels which approach the 1975-76 Federal emission standards for new vehicles. Well designed conversion systems with proper installation, inspection, and maintenance appear to present no more of a risk than gasoline-powered vehicles.

42634 **APTIC NO. 66478**

Turner, David W., Robert L. Andrews, and Charles W. Siegmund

INFLUENCE OF COMBUSTION MODIFICATION AND FUEL NITROGEN CONTENT ON NITROGEN OXIDES EMISSIONS FROM FUEL OIL COMBUSTION. *AIChE Symp. Ser., 68(126):55-65, 1972. 11 refs.*

The extent of fuel nitrogen conversion to nitrogen oxides and the degree of control possible with combustion modification were investigated. Depending on concentration, 40 to 80% of the fuel N2 from distillate and residual fuels is converted to NOx during combustion under normal operating conditions. This accounts for 100 to 200 ppm NOx at normal residual fuel N2 contents of 0.1 to 0.4% and less than 30 ppm with normal distillate fuels. Flue gas recirculation was effective in reducing NOx due to thermal fixation, but it has little or no effect on fuel N2 conversion. Simulated two-stage combustion has excellent potential for reducing both fuel NOx and thermal NOx to very low levels. (Author abstract modified)

42635 **APTIC NO. 62919**

Wright, James P.

REDUCTION OF STACK GAS SO2 TO ELEMENTAL SULPHUR. *Sulphur, no. 100:72-75, May/June 1972.*

A method for desulfurizing stack gas and producing elemental sulfur, used in a prototype plant, is described. Roaster gas passes through cyclone separators to reduce the dust loading to about 2-3 grains/standard cu ft; is cooled and purified; then is sent to a sulfur dioxide-reduction section, where the SO2 is reacted to methane to form elemental sulfur and hydrogen sulfide; and is then released by the stack, while the elemental sulfur is condensed, and the H2S and remaining unreacted SO2 are reacted in a Claus system to produce additional sulfur, which is also removed by condensation. This process is described in detail. The plant can reduce SO2 emissions by 90%, while producing high quality sulfur.

42636 **APTIC NO. 61613**

(Inventor not given.)

EXHAUST GAS RECIRCULATION CONTROL FOR INTERNAL COMBUSTION ENGINES. *(Regelvorrichtung fuer die Abgasrueckfuehrung bei einer Brennkraftmaschine). Text in German. (Automobiles Peugeot, Paris (France) and Regie Nationale des Usines Renault, Billancourt (France)) W. Ger. Pat. Appl. 2,129,076. 4p., Jan. 20, 1972. 5 refs. (4 claims).*

Exhaust gas recirculation control for internal combustion engines, facilitating the start of the latter, is described. Increasing pressure in the intake pipe causes a pneumatic actuator to close the recirculation valve. The control incorporates a rod between the actuator and valve, which also acts as the armature of a solenoid which adjusts the valve setting for the load range.

42637 **APTIC NO. 66492**

California Air Resources Board

SUMMARY OF HEARING ON THE FEASIBILITY OF CONVERTING GASOLINE POWERED VEHICLES IN THE SOUTH COAST AIR BASIN TO GASEOUS FUELS. *9p., Aug. 17-18, 1972.*

A summary of hearings on the feasibility of converting gasoline powered vehicles in the south coast air basin tc gaseous fuels is presented. The Riverside plan proposes to use natural gas to replace about 25% of the present gasoline consumed and liquefied petroleum gas to replace the remaining 75%. The conversion of all vehicles is to be completed in a 4-year period. Substitution of fuel oil for natural gas in power plants would result in an increase in sulfur dioxide emissions, a net reduction in emissions of hydrocarbons and carbon monoxide, and a tradeoff in emissions of oxides of nitrogen. The estimated reductions in emissions when using natural gas as compared to gasoline are 50% HC, 85% CO, and 45% NO_x; reductions when using liquefied petroleum gas are 30% hydrocarbons, 65% CO, and 30% NO_x. The absolute emission reductions attainable vary; the greatest reduction in emissions result from the use of natural gas in older, less completely controlled motor vehicles.

1971

42638 **APTIC NO. 58867**

Benson, J. D. and R. F. Stebar

EFFECTS OF CHARGE DILUTION ON NITRIC OXIDE EMISSION FROM A SINGLE-CYLINDER ENGINE. *Preprint. Society of Automotive Engineers, New York, 12p., 1971. 11 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710008.)*

The effects of charge dilution on the exhaust emission of nitric oxide (NO) from a single cylinder engine were evaluated over a range of engine design and operating parameters. Nitric oxide emission decreased as much as 70% as charge dilution fraction (volume fraction of product gases in the combustion chamber prior to ignition) was increased from 0.065 to 0.164 due to increased valve overlap, external exhaust recirculation, and reduced compression ratio. With these three variables, NO emission was strongly dependent on charge dilution fraction, but was independent of the specific method used to change charge dilution. Over variables such as valve overlap position, spark timing, and exhaust pressure also affected charge dilution fraction and NO emission for these variables was not consistent. (Author abstract)

42639 **APTIC NO. 66474**

Da Silva, Armando Tavares

STUDIES ON GAS-LIQUID ABSORPTION. ABSORPTION OF HYDROGEN SULFIDE AND CARBON DIOXIDE IN AQUEOUS AMINE SOLUTIONS. *(Estudos de absorca gas-luquido absorcao de sulfureto de hidrogenio e de dioxido de carbono em solucoes aquosas de aminas). Text in Portugese. Rev. Port. Quim., 13(3):185-210, 1971.*

The absorption and diffusivities of hydrogen sulfide into aqueous solutions of various amines were investigated. The penetration theory for absorption accompanied by instantaneous irreversible reaction was verified by absorption of H_2S in a laminar jet. Surface renewal models, as opposed to the film model, represent the absorption of H_2S into aqueous amine solutions in a packed column and in a stirred vessel. The absorption rate of carbon dioxide in aqueous solutions of amines in a laminar jet is substantially higher than that predicted by the penetration theory. Convection currents set up during absorption are greater than at higher concentrations of amines and partial pressure of CO_2.

42640 **APTIC NO. 60509**

Juricek, Eduard

FLARE STACK BURNER FOR GASES. *(Brenner zum Abfackeln von Gas). Text in German. (Gebrueder Sulzer AG, Winterthur (Switzerland)) W. Ger. Pat. Appl. 2,143,520. 4p., Aug. 31, 1971. 3 refs. (3 claims).*

A flare for stack gases, especially for the overflow gases from tanks containing liquid propane or methane, is described. The lower end of the mixing tube is flared out, and gas enters it through feed tubes at the flared part's periphery. The central section of the flared part is formed by a truncated conical shell whose upper, narrower circumference with the curved part of the flare forms an annular gas inlet gap into the mixing tube. The conical shell admits combustion air to the mixing tube. The upper end of the burner has a number of outlet channels which prevent blowback of the flame. The channels near the mixing tube wall are shorter than those near the center of this tube.

1954

42641 **APTIC NO. 66305**

Yamauchi, Jin

COLLECTING VALUABLE COMPONENTS HELD IN GAS WITH A VENTURI SCRUBBER. *(Benchuri sukurabba ni yoru gasuchu no yuko seibun no hoshu ni tsuite). Text in Japanese. Kagaku Kogaku (Chem. Eng.), vol. 18:489-495, 1954. 4 refs.*

Collection efficiencies of about 90% are reported for the recovery of pyridine bases and arsenious acid using a venturi scrubber. The scrubber was employed for recovering pyridine bases and naphthalene from coke oven gas and for removing arsenious acid in waste gas produced in dearsenization of iron ore by sintering. The recovery results indicate that the venturi scrubber is not only useful for separating gas-solid systems but also for absorbing specific constituents from gaseous streams.

MEASUREMENT METHODS

1974

42642 **APTIC NO. 65984**

Akland, Gerald G., S. David Shearer, and Graham J. Cleary

ANALYSIS AND PRESENTATION OF AIR QUALITY DATA FROM THE WHO COLLABORATIVE AIR MONITORING NETWORKS. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 127-143, 1974. (June 5-8.)*

Data aspects of the World Health Organization collaborative air pollution monitoring networks are described. Emphasis is placed on the importance of the data analysis and evaluation, since this aspect is commonly overlooked in monitoring activities. In addition, the various interlocking relationships from sampling through analysis and data evaluation are stressed. By properly recognizing the importance of valid data analysis, better quality information is produced that permits more meaningful trend assessment. The data handling and analysis of the monitoring system encompasses three sequential steps: submitting the raw (unsummarized) data; summarizing the validated data; and supporting the results. These steps are reviewed. (Author summary modified)

42643 **APTIC NO. 66392**

Anderson, Richard D., Nicolas A. Azelborn, and Wallace R. Wade

ISOKINETIC SAMPLING PROBE. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,793,887. 4p., Feb. 26, 1974. 5 refs. (Appl. Dec. 5, 1972, 10 claims).*

An isokinetic sampling probe for use in total automotive emission determinations is described which guards against the problem of premature condensation of gaseous elements without the use of dilution air. Emissions flowing into a through-duct are mixed, extracted through the isokinetic probe, and heated until analysis of the sampled gases is completed. A variable speed pump is utilized to equalize the instantaneous pressure drop through the probe with the instantaneous pressure drop through the exhaust duct. (Author abstract modified)

42644 **APTIC NO. 64710**

Atanus, Herbert

ENVIRONMENTAL CONTROL BY COMPUTERIZED GAS CHROMATOGRAPHY/MASS SPECTROMETRY. *West. Elec. Eng., 18(3):39-44, July 1974.*

Organic compounds are qualitatively and quantitatively analyzed at the Hawthorne Works by means of a computerized gas chromatography/mass spectrometry system. The system is used primarily to monitor manufacturing wastes, particularly emissions from stacks, to make sure that the wastes are harmless to the environment. It has applications in abstract and applied analytical chemistry, general organic analysis, pyrolysis product identification (identification of the chemical changes brought about by heat), and trace impurity determination. It can determine the molecular weights of compounds and analyze the raw materials used in encapsulants, oil films on integrated circuit boards, the pyrolysis products from cured resins, ans organic contaminants in plating solutions.

42645 **APTIC NO. 65761**

Baladi, Emile Y. and David L. Brenchley

A DYNAMIC GAS CONDITIONING SYSTEM FOR USE IN MONITORING THE CONCENTRATION OF COMBUSTION AEROSOLS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1974. 3 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-193.)*

A dynamic dilution system for conditioning a continuous drawn sample from a power plant stack was constructed for quick measurements of particulate concentration. The conditioning of the sample included dilution and cooling by nitrogen gas such that the particulate concentration in the sample nitrogen mixture may be measured by an electronic detector. A Quartz Crystal Microbalance (QCM) instrument can be used to detect the concentration of particulates in the mixture. Because of the continuous sampling-dilution and detection, two isokinetic samplers were operated: sampling from the stack for mixing and sampling from the mixture for detecting. The design of the system and its components is described. The venturi mixer design incorporated a carburetor action for better mixing. A regulated constant input of a diluent gas is piped into the system. A high volume blower controlled by a variac is incorporated at the output of the system. The performance of the system is evaluated through different test runs which proved the feasibility of using this system with a QCM instrument accurately and quickly in determining the particulate concentration in a power plant stack. (Author abstract modified)

42646 **APTIC NO. 66411**

Bartak, Josef

DUST SAMPLING IN FLOWING GASES - TWO DIMENSIONAL CASE. *(Staubprobenahme in stroemenden Gasen - Zweidimensionaler Fall). Text in German. Staub, Reinhaltung Luft, 34(8):295-300, Aug. 1974. 4 refs.*

The two-dimensional case of dust sampling from gas streams is discussed. The theoretical model is based on an idealized movement of the gas and dust particles and formulates the calculation of the relative dust concentration sampled with a nozzle in dependence on the chosen nondimensional parameters. Experiments under lab conditions verify and supplement the theoretical results. The theoretical and experimental results can further be utilized for the analysis of the influence of the particular dimensionless parameters and for the assembling of the dependence between these parameters in the analytical form. Experiments and theory are compared based on this dependence.

42647 **APTIC NO. 66340**

Baumgardner, R. E., T. A. Clark, and R. K. Stevens

INCREASED SPECIFICITY IN THE MEASUREMENT OF SULFUR COMPOUNDS WITH THE FLAME PHOTOMETRIC DETECTOR. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., 17p., June 1974. 6 refs.*

The development testing of a heated silver scrubber, that when used with either the flame photometric detector total sulfur monitor or the sulfur chromatograph will enable the measurement of hydrogen sulfide, is described. The scrubber removes atmospheric concentrations of H2S for extended time periods. Most urban atmospheres even near refineries or kraft mill activities rarely exceed 39.3 micrograms/cu m (30 ppb) of H2S and then only for brief periods. The system when automated can provide: semicontinuous total S and H2S measurement; measurement of H2S at low ppb concentrations with the total S monitor; specific measurement of sulfur dioxide or H2S at low ppb concentrations with the total S monitor; and measurement of H2S and carbonyl sulfide with the S chromatograph. (Author conclusions modified)

42648 **APTIC NO. 66142**

Berglund, Birgitta, Ulf Berglund, and Thomas Lindvall

A PSYCHOLOGICAL DETECTION METHOD IN ENVIRONMENTAL RESEARCH. *Environ. Res., 7(3):342-352, June 1974. 17 refs.*

Environmental problems involve weak sensory signals such as ambient odors and transportation noise. The potentialities and limitations of a signal detection approach for monitoring odorous air pollution are discussed. The detection method was applied to responses from human observers in four experiments. Two of the experiments focussed on methodological problems connected to olfactometry and physical-chemical detection procedures. The other two were field experiments that treated odor problems in traffic environments and areas around hog farms. The detection method separates the effects of biased responding by the observer from the odor sensitivity measure. Thus, the response criterion chosen by the observer cannot influence the measures obtained. The applicability of the method in environmental research is discussed from a theoretical and an applied point of view. The signal detection approach has clear theoretical advantages over classical threshold determinations and is well suited for monitoring ambient odors. (Author abstract)

42649 **APTIC NO. 62577**

Bidleman, T. F. and C. E. Olney

HIGH-VOLUME COLLECTION OF ATMOSPHERIC POLYCHLORINATED BIPHENYLS. *Bull. Environ. Contamination Toxicol., 11(5):442-250, May 1974. 10 refs.*

An efficient collection for polychlorinated biphenyls (PCB) vapors is described that allows hundreds of cubic meters of air to be sampled per day. The trap is a plug of porous polyurethane foam. The foam offers little resistance to air passage and therefore is compatible with high volume sampling apparatus. Collection studies with PCB isomers on Gelman glass fiber A (GFA) filters and polyurethane foam plugs were conducted outdoors with sampling periods varying from 12-34 hr and the temperature range approximately 5-20 C. Comparative runs were made with a Greenburg-Smith impinger containing ethylene glycol, the system used by the Environmental Protection Agency for sampling airborne pesticides. The collection efficiency of the impinger for PCB vapors is lower than for the foam plugs. Glass fiber filters are commonly used to collect high volume particulate samples and are efficient collectors of DDT dusts and some organophosphorus insecticide vapors under low flow conditions. They are poor collectors for PCB vapors during high volume sampling, but the GFA filters appear to have a slightly higher collection efficiency for the less volatile pentachlorobiphenyl than for the tri- or tetrachlorobiphenyls.

42650 **APTIC NO. 66444**

Birnbaum, M. and A. W. Tucker

NO2 MEASURING SYSTEM (FINAL REPORT). The *Aerospace Corp., Los Angeles, Calif., Electronics Research Lab., Environmental Protection Agency Contract 68-02-1225, ROAP 56AAI, Program Element 1AA010, Rept. EPA-650/2-74-059, 34p., May 1974. 6 refs.*

NTIS: PB 234225/AS

A prototype nitrogen dioxide measuring system is described in which a laser is used to excite the NO2 molecules whose concentration in the atmosphere is monitored by their resultant fluorescence. The signal is obtained from the NO2 molecules, and therefore the method does not involve chemical processing or other procedures which could compromise the accuracy of the measurements. The technique is free of interference from the presence of other gases, and the fluorescence method provides real-time, automatic monitoring of ambient atmosphere NO2 levels. The detectability of the instrument is 0.6 ppbv for an 80-second integration time, and the response is linear over the range of 10-100 pphmv.

42651 **APTIC NO. 63219**

Blachman, Marvin W. and Morton Lippmann

PERFORMANCE CHARACTERISTICS OF THE MULTICYCLONE AEROSOL SAMPLER. *Am. Ind. Hyg. Assoc. J., 35(6):311-326, June 1974. 22 refs.*

The multicyclone aersol sampler of Lippmann and Kydonieus was redesigned for use in underground coal mines. It includes an intrinsically safe battery-powered brushless dc motor coupled to a vane pump. Particles are collected by seven parallel samplers which surround a common inlet. Six samplers consist of a 10-millimeter nylon cyclone and a filter in series. Each cyclone operates at a different flow and has a different size cut. The seventh sampler is a filter alone. Analysis of the seven filter samples permits the construction of a size-mass distribution curve describing the airborne aerosol. Cyclone collection efficiencies were determined for aerodynamic particle sizes from 0.3 to 8 micron and for flow rates between 0.9 and 30 l/min. The effects of particle electric charge, cyclone orientation, aerosol concentration, sample mass collected, and sampling rate pulsations on cyclone collection were also determined. (Author abstract)

42652 **APTIC NO. 66425**

Buijtenen, C. J. P. van and F. Oeseburg

COMPARISON OF LIGHT SCATTERING DIAMETER BASED ON FORWARD SCATTERING MEASUREMENTS AND AERODYNAMIC DIAMETER OF AEROSOL PARTICLES. *Atmos. Environ., 8(9):885-896, Sept. 1974. 15 refs.*

The influence of the physical properties of aerosol particles on the light scattering diameter determined with a Royco particle monitor, Model 225, was investigated to evaluate the suitability of the monitor for air pollution monitoring. The light scattering diameter was compared with the aerodynamic diameter determined with a Stoeber aerosol spectrometer. Particles of sodium fluoride, sodium chloride, copper sulfate, nickel sulfate, malachite green, particulate carbon, and atmospheric aerosol were used as test aerosols. The median of the aerodynamic diameter was approximately 0.5 micron. The light scattering diameter was larger than the aerodynamic diameter by a factor ranging from 1.2 to 2.4, and larger than the equivalent diameter by a factor of from 1.3 to 3.2. The differences between results obtained with the Royco particle monitor and the aerosol spectrometer could be explained qualitatively by the differences in optical properties and shape of the particle. In spite of the nonmonotonous calibration curve, the Royco Model 225 can be used to measure a size distribution provided that the distribution is not too narrow and of regular shape. For applications where a reasonable accuracy in particle size is desired, the Royco particle monitor should be especially calibrated for the aerosol under consideration. (Author abstract modified)

42653 **APTIC NO. 65982**

Bultynck, H., J. Bonnijns, and G. van Roosbroeck

ACQUISITION, VALIDATION AND REDUCTION OF THE DATA COMING FROM AUTOMATED MONITORING STATIONS. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 89-106, 1974. 2 refs. (June 5-8.)*

The objectives of an automated air quality network, and the acquisition, validation, and reduction of the data coming from such a network are described and discussed. Two sets of data can be gathered: a set related to actual measurements, and a set connected with calibration values. The normal and calibration measurement procedures are described. Flow charts are presented of the data handling system. An example is given of data gathering from a meteorological tower.

42654 **APTIC NO. 66352**

Chamberlin, David and R. E. Sanders

REVIEW OF COMMERCIAL OZONE MEASUREMENT INSTRUMENTATION. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:112-117, 1974. 16 refs. (Presented at the Instrumentation for Monitoring Air Quality Symposium, Boulder, Colo., Aug. 14-16, 1973.)*

Methods used for the quantitative measurement of ozone in commercial instrumentation are reviewed. The methods discussed are wet chemical methods for total oxidants based on the neutral buffered potassium iodide method and ozone-specific analytical methods such as ultraviolet absorption and chemiluminescence. The limits of specificity, sensitivity, accuracy, repeatability, and response time are discussed. Characteristics of the ozone-ethylene chemiluminescent reaction which make it the preferred method are examined. Major subsystems of the chemiluminescent analyzer are presented, with consideration of the important parameter variations associated with each. Basic specifications, operating conditions, and typical maintenance tasks are summarized. Finally, a brief look at recent developments and future trends is given. (Author abstract modified)

42655 **APTIC NO. 66545**

Chan, P. W.

OPTICAL MEASUREMENTS OF SMOKE PARTICLE SIZE GENERATED BY ELECTRIC ARCS (FINAL REPORT). *Colorado State Univ., Fort Collins, Environmental Protection Agency Grant R-800150, Program Element 1AB012, Rept. EPA-650/2-74-034, ROAP 21ADL-21, 49p., June 1974. 20 refs.*

NTIS: PB 236580/AS

Light extinction and photometric scattering measurements employing laser sources were used for sizing polydispersed metallic particulate systems of unknown index of refraction. Average size measurements were obtained on several metallic and non-metallic particulate systems; the size distribution can also be obtained by computer calculation. The polarization ratio method gives better sensitivity for smaller sub-micron particles (though dependent on refractive index unless forward scattering is used) and is successful in measuring size distribution of sub-micron latex spheres. The intensity ratio method (at two forward scattering angles) and the polarization ratio method (at one forward angle) for sizing polydispersed particulate systems and developing it into real time devices are discussed. (Author abstract modified)

42656 **APTIC NO. 65985**

Cocquyt, G., J. F. de Greef, and J. Vandervee

DATA MANAGEMENT FOR THE COMPUTATION OF URBAN POLLUTION MODELS. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 167-194, 1974. 8 refs. (June 5-8.)*

The basis of all pollution computation is a mathematical mode. For air pollution, the results at a point x,y due to pollution sources at x(sub i) y(sub i) depends on a lot of meteorological and source variables such as the wind direction, wind speed, temperature gradients, height of the mixing layer, characteristics of the stacks, and temperature of the effluents. In principle, two methods can be used for the handling of these meteorological and source data. One method starts from a plume-data bank and avoids insertion of the data corresponding to the source coordinates, wind direction, and pollutant flow; the other method computes pollution charts, recalculating the pollution plumes for each source. The last method has the advantage of avoiding discretization of all variables corresponding to the source characteristics. Advantages and disadvantages are considered as a function of computer time and the objectives of computation which may be, for example, the frequency distribution of hourly mean values due to many sources in an area of several sq km, the contribution of new sources to the existing background of a region, or the comparison between different sites. (Author summary)

42657 **APTIC NO. 65986**

Cocquyt, G.

USING Z-TRANSFORMS TO DETERMINE DIGITAL FILTERS FOR THE ON-LINE CALCULATION OF THE MEAN OF METEOROLOGICAL AND POLLUTION DATA. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 195-223, 1974. 1 ref. (June 5-8.)*

In general there are two distinct types of signals detected in air pollution: a smooth signal, such as temperature; and a noisy signal such as wind speed. Both signals are supposed to represent reality; however, one may have noise-corrupted signals. Sometimes the noise is of a different nature and has a higher frequency spectrum, while the signal itself is rather smooth. In general, the stochastic signals are used as either an auto-correlation function or as a power spectrum. In general, data are filtered by calculating their mean value using for example the last 12 samples. This may be an hourly mean of data collected every 5 min. The ways of filtering the data are reviewed, and a method using z-transforms to determine the digital filters for the on-line calculation of the mean of meteorological and pollution data is described. Almost memoryless digital filters for the calculation of the mean are described.

42658 **APTIC NO. 66319**

Coffer, Jerry W. and Robert J. Charlson

SO2 OXIDATION TO SULFATE DUE TO PARTICULATE MATTER ON A HIGH VOLUME AIR SAMPLER FILTER. *Preprint, American Chemical Society, Washington, D. C., 15p., 1974. 5 refs. (Presented at the American Chemical Society National Meeting, 167th, Los Angeles, Calif., April 1974.)*

The oxidation of sulfur dioxide to sulfate on a high volume air sampler filter (HVAS) is discussed. Sulfur dioxide oxidation is promoted by the presence of ambient aerosol, high SO2 concentration, ambient relative humidity, and/or the existence of strong bases and catalysts in the mixture. The hygroscopic nature and pH of the sampled ambient aerosol appeared to have little effect on oxidation. So many variables are or could be involved in the complex mixture in the atmosphere that it is not possible to isolate one mechanism for the oxidation.

42659 **APTIC NO. 66522**

Craig, S. E., D. R. Morgan, D. L. Roberts, and L. R. Snowman

DEVELOPMENT OF A GAS LASER SYSTEM TO MEASURE TRACE GASES BY LONG PATH ABSORPTION TECHNIQUES: VOLUME I - GAS LASER SYSTEM MODIFICATIONS FOR OZONE MONITORING (FINAL REPORT). *General Electric Co., Pittsfield, Mass., Electronic Systems Div., Environmental Protection Agency Contract 68-02-0757, Program Element 1AA010, Rept. EPA-650/2-74-046-a, ROAP 26ACX, OS 74-13, 128p., June 1974. 31 refs.*

NTIS: PB-236 678/AS

Modifications of a gas laser system for long path monitoring of trace atmospheric constituents by infrared absorption are described. Modifications were made in preparation for an ozone field measurement program in which path monitor data are compared with those from a point monitor moved along the optical path. System modifications included incorporating a digital signal processor in the system and a spatial filter in the laser beam. Spectral studies of O3, carbon dioxide, water vapor, ethylene, and ammonia are presented in connection with the selection of laser wavelengths used in the system to discriminate O3 effects from interferences. Design considerations and a proposed configuration for an isotopic CO2 laser are presented. (Author abstract modified)

42660 **APTIC NO. 64430**

Darby, William P., Paul J. Ossenbruggen, and Constantine J. Gregory

OPTIMIZATION OF URBAN AIR MONITORING NETWORKS. *Proc. Am. Soc. Civil Engrs., J. Environ. Eng. Div., 100(EE3):577-591, June 1974. 31 refs.*

A linear programming model for locating air sampling sites in an air monitor network is described which is based upon the overall pollution dose to the population at large. A measure of the system effectiveness quantifies the effects of pollution on the population with regard to age, pollution dosage, and exposure time. The method considers budgetary constraints and abides by the rules and spirit of the Environmental Protection Agency s primary and secondary air quality standards. The numerical results obtained by the linear programming model show that the locations of sampling sites in some instances are different from the existing site locations and that the measure of system effectiveness of the existing network can be improved significantly. (Author summary modified)

42661 **APTIC NO. 66441**

Derwent, R. G. and H. N. M. Stewart

INSTRUMENTATION FOR AUTOMATIC MONITORING OF TRAFFIC POLLUTION. *Meas. Contr., vol. 7:101-108, March 1974. 5 refs.*

Instrumentation for automatic monitoring of gaseous pollution from motor vehicles is described. Methods and instruments are presented for measuring carbon monoxide, hydrocarbons, oxides of nitrogen, ozone, and sulfur dioxide. Calibration is important and selected example procedures are described. The calibration of a chemiluminescent nitric oxide-nitrogen dioxide monitor using standard gases and the Saltzman colorimetric procedure is described. The chemiluminescent monitor showed accurate linear reponse over the concentration range 0-100 pphm. The converter efficiency was constant over this range and was measured at 88 plus or minus 6%. Data processing and magnetic tape storage programs were developed so that the traffic specific pollutants can be clearly correlated with traffic and meteorological factors. (Author abstract modified)

42662 **APTIC NO. 66105**

Duvall, Phillip M. and Richard C. Bourke

PERSONAL AND HIGH-VOLUME AIR-SAMPLING CORRELATION PARTICULATES. *Environ. Sci. Technol., 8(8):765-767, Aug. 1974. 2 refs.*

Airborne particulate measurements are required both outside and inside an industrial plant to determine compliance with existing control regulations. The Environmental Protection Agency specifies a high-volume sampling method for outside ambient air, while the Occupational Safety and Health Administration personnel generally use personal monitoring for determining particulate levels inside a plant. A personal monitoring method using a membrane filter was developed which correlates with the EPA reference method in three types of ambient atmospheres: a clean laboratory area, outside ambient air in an industrial location, and inside an industrial plant in an area where oil mist is the predominant contaminant. The comparative sampling experiments are described. Good agreement was obtained in all three cases after compensation was made for the effects of adsorbed moisture. (Author abstract modified)

42663 **APTIC NO. 66285**

Ellis, E. Carol and John H. Margeson

AN EVALUATION OF THE TRIETHANOLAMINE PROCEDURE FOR THE DETERMINATION OF NITROGEN DIOXIDE IN AMBIENT AIR. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Methods. Standardization Branch, 34p., April 1974. 11 refs.*

The triethanolamine (TEA) manual procedure for measurement of nitrogen dioxide in ambient air was evaluated. The method involves sampling for 24 hr with a fritted bubbler immersed in 0.1 N TEA collecting solution. The range of the method is approximately 20 to 700 micrograms/cu m. The method has a high collection efficiency of 80% using fritted bubblers for gas dispersion. The use of a frit is a disadvantage to the method because the frit porosity needs to be checked periodically and these bubblers are easily broken under normal usage. The collection efficiency obtained by using the more preferable restricted orifice bubbler is 50%, too low to warrant its use. There are better methods available and no further work on the TEA method is justified. (Author conclusions modified)

42664 **APTIC NO. 66490**

Farzane, N. G. and L. V. Ilyasov

AUTOMATIC GAS DETECTORS. *(Avtomaticheskiye detektory gazov). Moscow, Energiya, March 3, 1972, 168p., 143 refs. Translated from Russian. Joint Publications Research Service, Arlington, Va., 134p., March 18, 1974.*

NTIS: JPRS 61505

Automatic gas detectors for use in automatic gas analyzers are reviewed in terms of their structural features, comparative characteristics, and calibration methods. Detailed descriptions are given of gas detectors sensitive to density, viscosity, heat of combustion, and dielectric constant. Detectors based on various effects of ionization of gases and on optical and acoustic phenomena are also described. A variety of calibration methods are described, including those applicable to gas detectors in combination with gas chromatography.

42665 **APTIC NO. 66204**

Faxvog, Frederick R.

DETECTION OF AIRBORNE PARTICLES USING OPTICAL EXTINCTION MEASUREMENTS. *Appl. Opt., 13(8):1913-1919, Aug. 1974. 13 refs.*

A method for obtaining real time size distributions of airborne particles is discussed, and experimental sensitivity measurements are presented. By detecting the transmitted power of a low noise helium-neon laser, the optical extinction cross sections of individual particles are measured as they flow through the focused beam. Calculations for various absorbing materials show the extinction cross sections are from one to more than two orders of magnitude larger than their scattering cross sections for particle diameters in the 0.02-0.2 micron range. Sensitivity calculations and measurements indicate extinction cross sections down to 2 times 10 to the minus 12th power sq cm can be detected. Absorbing particles as small as 0.04 micron diameter can be measured using this technique. (Author abstract modified)

42666 **APTIC NO. 66126**

Fjarlie, E. J.

SOME GENERAL INFORMATION ON AIR POLLUTION. *RCA Eng., 20(2):42-45, Aug./Sept. 1974. 20 refs.*

A review is presented on air pollution measurement, the establishment of threshold limits, and specific measurement techniques. Most pollution measurements are atmospheric transmittance measurements at the selected wavelengths where the pollutant is detectable, with gases being normally detected by a forward receiving process and particulates by forward or backward scattering. The automobile is the main source of pollution, contributing a considerable portion of the carbon monoxide, hydrocarbons, and nitrogen oxides; while industry is the main source of sulfur dioxide and particulates and also contributes to the hydrocarbon emissions. Pollutant concentration levels established for CO, SO2, hydrocarbons, nitrogen dioxide, particulates, ozone, and hydrogen sulfide are reviewed and compared with exposures received by taxi drivers, smokers, and megapolis area inhabitants. Specific measurement techniques reviewed include: Ringelmann chart measurements of smoke color, light detection and ranging (LIDAR) measurements of particulate concentration, correlation spectroscopy, and Raman scattering.

42667 **APTIC NO. 61939**

Foster, J. F., G. H. Beatty, and J. E. Howes, Jr.

INTERLABORATORY COOPERATIVE STUDY OF THE PRECISION AND ACCURACY OF THE MEASUREMENT OF DUSTFALL USING ASTM METHOD D1739. (FINAL REPORT). *American Batelle Memorial Inst., Columbus, Ohio, Columbus Labs., Society for Testing and Materials Data Series Publication DS 55-S4, 05-055040-17, 50p., April 1974. 6 refs.*

Results are presented from an experimental study of the variability inherent in measurements of dust fall, using American Society for Testing and Materials Method D 1739; a description of the experimental program together with tabulations of the data and the statistical interpretations of the results are also provided. Statistical analysis of 84 dust fall determinations performed in accordance with the method produced the following results: the average standard deviation for variations among single dust fall measurements by different laboratories is 1.46 g/sq m/mo and is associated with a mean dust fall of 6.45 g/sq m/mo; the average standard deviation for variations among repeated dust fall measurements within laboratories is 1.03 g/sq m/mo; the average recovery of water soluble and water insoluble dust spikes is 96% with a standard deviation of 16%; the average standard deviations of between- and within-laboratory determinations of the water-insoluble fraction of ambient dust fall samples are 1.18 and 0.78 g/sq m/mo, respectively; the average recovery of water insoluble dust fall spikes by all laboratories and at all sites is 91% with a standard deviation of 18%; the standard deviations of between- and within-laboratory determinations of the water-soluble fraction of ambient dust fall samples are 1.64 and 0.59 g/sq m/mo, respectively; and the average recovery of water-soluble dust fall spikes by all laboratories and at all sites is 95% with a standard deviation of 37%. (Author summary modified)

42668 **APTIC NO. 66230**

Ghosh, A. K. and H. J. Moody

A MICROWAVE CORRELATION SPECTROMETER FOR AIR POLLUTION MONITORING. *RCA Eng., 20(2):46-48, Aug./Sept. 1974. 11 refs.*

A microwave correlation spectrometer based on the principle of correlation spectroscopy is described for the monitoring of gaseous air pollutants down to the ppb level with high specificity. The spectrometer includes a modulation process which allows fully coherent detection to be conducted. The modulation consists of biphase modulation between 0 and 180 degrees which causes the signal at the output of the magic-tee to alternate between sum and difference signals, permitting the use of only one square-law device and one amplifier and eliminating the problem of matching two square-law devices. Several pollutants can be monitored using the same instrument; thus, a correlation spectrometer in the K-band (18-26.5 GHz) can be used to monitor such gases as sulfur dioxide, nitrogen dioxide, ozone, ammonia, acetaldehyde, isobutane, propane, propene, and others, while an instrument using the pre-recording technique offers the possibility of monitoring several of these gases simultaneously.

42669 **APTIC NO. 66351**

Goldberg, R. D.

AUTOMATIC CHEMICAL ANALYSIS -- THE FIRST LINE OF APPROACH. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:118-124, 1974. 10 refs. (Presented at the Instrumentation for Monitoring Air Quality Symposium, Boulder, Colo., Aug. 14-16, 1973.)*

Techniques for specific and accurate measurement of air quality parameters have long been sought from the field of wet chemical analysis. Air pollution applications, operations and procedures of continuous wet chemical analysis instruments, and measurement of the effects of air pollution are discussed. Wet chemical techniques now used include the West-Gaeke method for sulfur dioxide, the Technicon AutoAnalyzer for SO2 and nitrogen dioxide using the West-Gaeke and Jacobs-Hochheiser methods, respectively, and automated determination of sulfate in rainwater by the reaction of sulfate with barium chloride and methyl thymol blue. A continuous flow analysis system using colorimetry can be used for the determination of SO2, NO2, ammonia, aldehydes, hydrogen sulfide, chloride, sulfate, and fluoride in ambient air. (Author abstract modified)

42670 **APTIC NO. 66354**

Goldgraben, G. R.

MONITORING OXIDES OF NITROGEN -- AN OVERVIEW. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:36-43, 1974. 7 refs. (Presented at the Instrumentation for Monitoring Air Quality Symposium, Boulder, Colo., Aug. 14-16, 1973.)*

Oxides of nitrogen can be measured by wet chemical colorimetric, chemiluminescent, electrochemical, infrared, ultraviolet, and correlation spectrometric instruments. These methods vary in sophistication, application, and cost and exhibit different advantages and disadvantages which must by considered in determining the most applicable instrument for a specific monitoring purpose. These instruments can be used for ambient air monitoring, occupational health monitoring, stationary source analysis, and engine exhaust monitoring. The six commercially instrumented methods have prices ranging from $1800-$20,000. (Author abstract modified)

42671 **APTIC NO. 66129**

Hamilton, Charles Eugene

DEVICE AND METHOD FOR MEASURING RELATIVE CONCENTRATION CHANGES IN GAS STREAM COMPONENTS. *(The Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,793,158. 10p., Feb. 19, 1974. 10 refs. (Appl. Feb. 5, 1971, 20 claims).*

A galvanic method for measuring relative concentration changes in gas streams containing such reactive components as oxygen, chlorine, bromine, iodine, sulfur dioxide, sulfur trioxide, hydrogen sulfide, carbon monoxide, and compatible mixtures thereof is presented which offers greater sensitivity to oxidants, particularly oxygen, than prior art galvanic analytical methods. The method consists of passing the fluctuating gas stream over the juncture of a sample electrode and an aqueous electrolyte containing a mobile soluble ion, with the sample electrode being in electrolytic contact with a reference electrode formed of substantially identical metal and the former electrode at least being foraminous. No impressed voltage or amperage is applied. The small potential difference across the electrodes generated by chemical equilibrium shifts in the concentration cell caused by fluctuations in the gas stream composition are measured by a sensitive Wheatstone bridge or a microammeter or any other sensitive detection means.

42672 **APTIC NO. 66572**

Hellman, Thomas M.

THE MEASUREMENT OF ODORS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 27-38. 18 refs. (March 7-8.)*

Methodology associated with sampling, identification, and quantification of odors using human odor judges is summarized. A common method for screening odor panel candidates is the triangle test in which the subject is presented three samples, two identical and one different, and asked to choose the odd sample. Simple grab sampling techniques may be adequate if the sample requires neither dilution nor concentration. Dilution sampling may be accomplished dynamically by ratioing the flow rate of odor-free air to that of the source stream; or, alternately, a sample directly from the odorant source can be transferred to a larger container having enough odor-free air to satisfy the dilution requirements. Other methods of sampling include freeze-out sampling where the source stream is passed through a cold trap that freezes and holds the odorous components and adsorptive sampling involving the use of an activated carbon or silica gel column to concentrate the odorous material. Olfactometers are used to control and measure the required dilutions of odorous materials during odor evaluation; limitations of portable olefactometers include a limited dilution range and the necessity of relying on a single odor observer. Test chambers may be used either to present the odor to a number of judges by surrounding them with the odorous gas or to provide an odor-free environment for sensory testing by other methods of sample presentation. Complications in sensory odor evaluation include the existence of odor adaptation and interindividual differences in sensation.

42673 **APTIC NO. 66377**

Homolya, James B. and Robert J. Griffin

DILUTION DEVICE FOR COUPLING MONITORS TO SOURCE EMISSIONS. *Anal. Letters, 7(4):299-312, 1974. 5 refs.*

A dilution device for coupling continuous gaseous source monitors to stacks or ducts is described which eliminates the problems of moisture condensation and particulate entrainment in sampling systems by diluting the stack gas in-situ and measuring the resulting sample stream with ambient air sensors. The complete monitoring system consists of three basic components: a disc diluter head with a probe and drive mechanism, a control console to furnish a known volumetric flow of diluent, and an ambient air monitor. The head assembly contains an air inlet tube with a return line through which a measured stream of diluent can elute the sample chambers and provide a continuous sample stream to a monitor. The head assembly annd probe are designed to be easily inserted into a 7.62 cm ID sample port. Field tests with the disc diluter installed in the flue gas stream of a 190 MW pulverized coal boiler incorporating electrostatic precipitators indicate the viability of the technique, though comparison tests over a wide range of plant operating conditions are necessary to determine the linearity of response for the dilution system. Graphical data are presented for sulfur dioxide concentration versus generator load.

42674 **APTIC NO. 66405**

Horn, K., A. Knauer, and W. Doerre

PRODUCTION OF TEST GASES WITH CONSTANT TRACE CONCENTRATIONS. *(Herstellung von Testgasen mit konstanten Spurenkonzentrationen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 20(8):465-467, 1974. 6 refs.*

A new diffusion method for maintaining constant trace concentrations in continuous-flow carrier gases. As opposed to conventional methods, a solvent (e.g., water) is used which contains the substance to be dosed in a suitable form and adjusted concentration. Solution and gas room are separated by a suitable permeable medium (e.g., polyethylene). Following a period of adjustment, the substance to be dosed passes at constant temperature and a very small and constant rate into the gas volume suffused with carrier gas. In the pretreated carrier gas set to a fixed flow volume trace concentrations are measured which remain nearly constant over a very long time.

42675 **APTIC NO. 65966**

Ishiguro, T., T. Oodaira, Y. Iwasaki, H. Fukushima, and H. Onozuka

A NEW METHOD FOR MEASURING ODORS (TRIANGLE ODOR BAG METHOD). *In: Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Research Inst. for Environmental Protection (Japan), p. 1-13, 1974.*

The triangle odor bag method using a panel of four or more persons, each examining three numbered bags is described. One of the three bags contains odor at a given dilution ratio. Each person is required to give, if he can, the number of the odor-containing bag. The American Society for Testing and Materials syringe method is discussed. The triangle method was developed to overcome the disadvantages of the syringe method which are: odor is adsorbed on the sliding surface between plunger and cylinder; the small capacity of the syringe; it is unnatural because odor and air are injected into the nostril; it is troublesome to prepare a sample of high dilution ratio; and the monitor s preconceived idea cannot be removed. A new index for expressing odor concentration and the theory of the triangle odor bag method are presented. The triangle odor bag procedure, results of odor tests carried out by the triangle odor bag method at fishmeal and meatborn meal factories, and the number of panel members are discussed. The triangle odor bag method is considered the best sensory test method, and the sensory test method is considered better than chemical methods which can have only a supplementary role to play, considering the peculiarities of odor pollution.

42676 **APTIC NO. 64622**

Ito, Hiroshi and Akira Nakazawa

THE MANAGEMENT AND MAINTENANCE OF SALTZMAN NOX METER (FOR THE ENVIRONMENT). THE ACCURACY MAINTENANCE. *(Zarutsuman shiki NOx-kei (kankyoyo) no seido iji no tame no kanri to mentenansu ni tsuite). Text in Japanese. Keiryo Kanri Keisoku Keiso (J. Instrum. Control Assoc. Japan), 23(5):12-14, 1974.*

The Saltzman-type automatic nitrogen oxides meter is discussed. The sampling air passes through the dust filter and enters the nitrogen dioxide impinger through the flowmeter. Nitrogen dioxide is absorbed by the reagent in the impinger and produces color. The air passes a trap and its nitric oxide is oxidized in the liquid before entering the NO impinger. The oxidized NO, or NO2, produces color. The colorimetry cells under both impingers indicate the measurement of NO2 in the air. The instrument must be installed in a room without vibration, and without direct sunlight. The room temperature and humidity must be controlled; a temperature above 40 C will affect the amplifier and reagent. The air sampling tube should be short and should be sheltered from the rain. The frequency of air flow adjustment, dust filter exchange, and soda lime exchange depends on the environmental conditions. The frequency of water removal from the mist trap exchange of oxidation liquid, reagent supply, zero point adjustment, and recording ink supply should be once every other week. The recording paper should be exchanged once a month; the lamp must be exchanged once every four months; the air pump diaphragm exchange, span adjustment by equivalent liquid, greasing of glass contacts, and washing of glass parts must be done once every six months. The photoelectric cell should be exchanged once a year and the colorimetry optical parts must be cleaned as often as necessary.

42677 **APTIC NO. 66407**

Kaestner, Fritz, Klaus R. Kuhn, and Gerd Loch

AUTOMATIC X-RAY SPECTROMETER FOR ENVIRONMENTAL PROTECTION. *(Automatisches Roentgenspektrometer fuer den Umweltschutz). Text in German. Elektrotech. Z. B, 26(21):554-557, 1974. 9 refs.*

X-ray spectrometric analysis has been successfully employed for monitoring air pollutants. Sampling has been fully automatized. The airflow to be examined is drawn at constant rate through the filter disk. The full filter is replaced fully automatically in selectable intervals by a new filter. All that is required from the operator is the insertion of a new filter magazine and collection of the exposed filters. In the analysis by the multi-channel X-ray spectrometer the samples are exposed to the radiation from an X-ray tube. The X-ray fluorescence radiation emanating from the sample is passed to 17 spectrometer channels. A great number of samples can be analyzed with little manual effort. Accuracy and detection limit fulfill all practical requirements.

42678 **APTIC NO. 66123**

Kanagawa, Akira

RESPONSE CALCULATION OF LIGHT SCATTERING PHOTOMETER FOR MEASUREMENT OF AEROSOL CONCENTRATION. *(Earozoru nodo sokuteiyo kosanran fotometa no oto keisan). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 38(7):513-519, July 1974. 9 refs.*

A theoretical calibration of a light-scattering photometer response for measurement of aerosol particle concentration is made with non-absorbing spherical particles having a log-normal size distribution. The response curves, expressed as the ratio of photocurrent of the phototube to aerosol particle concentration, are calculated from the Mie theory with various optical lens geometries, taking account of the spectrum characteristics of the light source and the phototube. The ratio of photocurrent to aerosol concentration varies widely with particle size and size distribution and only slightly with refractive index of the particle. The response curves as functions of the geometric mean diameters for the log-normal size distribution depend strongly upon the degree of dispersion, though curves with the fifth moments mean diameter depend little on the degree of dispersion.

42679 **APTIC NO. 66493**

Kendall, D. A., P. L. Levins, and G. Leonardos

DIESEL EXHAUST ODOR ANALYSIS BY SENSORY TECHNIQUES. *Preprint, Society of Automotive Engineers, New York, 13p., 1974. 15 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740215.)*

The odor profile method was applied to the measurement and analysis of diesel exhaust odor. The human sensory panel described the odor of diluted exhaust and analytical fractions isolated from the exhaust in terms of total intensity of aroma and individual odor character notes. For convenience, diesel exhaust odor was described in two character groups -- oily-kerosene and smoky-burnt odor. The odorous species were determined by detailed chemical analyses supported by comparative data from reference compounds. To achieve reliable quantitative odor intensity measurements, it was necessary to present the odor panel with a series of concentrations (dilutions) of exhaust in air over a wide range. The odor intensity at a given exhaust concentration was computed from a least squares analysis of the entire panel data. The results demonstrated an odor intensity range of slight to moderately strong for diesel exhaust at 1000:1 dilution. (Author abstract)

42680 **APTIC NO. 66283**

Kim, Ann G. and Louis J. Douglas

GAS CHROMATOGRAPHIC METHOD FOR ANALYZING GASES ASSOCIATED WITH COAL. *Bureau of Mines,* *Pittsburgh, Pa., Pittsburgh Mining and Safety Research Center, RI 7903, 12p., 1974. 9 refs.*

A gas chromatographic method that utilizes both thermal conductivity and flame ionization detectors is described for the analysis of gas samples associated with coal that contain oxygen, nitrogen, hydrogen, helium, carbon dioxide, carbon monoxide, methane, and trace amounts of C2 to C5 hydrocarbons. A porous polymer support and molecular sieve columns are used with argon as the carrier gas. A column selector valve makes it possible to perform a complete analysis either on one 1 ml sample in 40 min or on two samples in 20 min, one sample for each detector. Samples are introduced either by on-column injection or through a gas sampling valve. The speed, sensitivity, and accuracy of analysis may be modified to suit a particular situation by varying operational parameters. Analytical data and operating conditions are given for a variety of samples. (Author abstract modified)

42681 **APTIC NO. 66254**

Kimura, Tatsuo

METHOD FOR DETERMINATION OF SULFUR OXIDES IN AIR BY X-RAY FLUORESCENCE SPECTROSCOPY. *(Keiko X-senho ni yoru taikichu io sankabutsu sokuteiho ni kansuru kenkyu). Text in Japanese. Kogai Shigen Kenkyusho Iho (Bull. Pollut. Resour. Res. Inst.), 3(3):33-40, March 1974. 1 ref.*

A method for the determination of sulfur oxides in air by X-ray fluorescence spectroscopy is described. Sulfur oxides in air are concentrated and changed into sulfuric acid in the absorbing solution. Barium sulfate is precipitated with barium chloride solution. Trace analysis of SOx is made by the measurement of the characteristic X-radiation of sulfur or barium in the precipitate. The method has a little lower sensitivity than the liquid electric conductivity measurement, but is useful in the measurement after air sampling for hours or a day. Simplified measuring apparatus for liquid electric conductivity is available to compare the X-ray method with conductivity measurement. Sulfur oxides of some samples were determined by the two methods and compared.

42682 **APTIC NO. 66422**

Klose, Erhard, Guenter Lange, and Erich Kaltofen

COMPARATIVE STUDIES FOR DETERMINATION OF THE TOTAL SULPHUR IN SOLID FUELS. *(Vergleichende Untersuchungen zur Bestimmung des Gesamtschwefels in festen Brennstoffen). Text in German. Freiberger Forschungsh. A, vol. (534):125-134, 1974. 5 refs.*

A new rapid method for determination of the sulfur content in solid fuels is described and compared with the methods by Eschka and Seuthe. The fuel is burned in an oxygen flow at 1350 C. The developing sulfur dioxide is converted by iodine in the presence of water to hydriodic acid and sulfuric acid. A single analysis lasts only 5-8 min. A comparison of the results of 19 examined samples with the two standardized methods yielded good agreement.

42683 **APTIC NO. 66368**

Koehler, Albert

REMARKS CONCERNING THE MEASUREMENT OF THE CO2 CONCENTRATION IN PRESENCE OF WATER VAPOR. *(Bemerkungen ueber die Messung der CO2-Konzentration in Gegenwart von Wasserdampf). Text in German. Staub, Reinhaltung Luft, 34(8):305-308, Aug. 1974.*

A simple and cheap method which avoids all errors introduced by water vapor in nondispersive infrared gas analysis is described. It maintains a constant water vapor pressure by running the air and the calibrating gases through a humidifier and two condensers in series placed inside a cooler temperature controlled at slightly above the freezing point.

42684 **APTIC NO. 65981**

Kretzschmar, J. G. and G. Fieuw

A PILOT NET AS SCALE MODEL AND RESEARCH UNIT FOR LARGE AUTOMATED AIR QUALITY MONITORING NETWORKS. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 81-87, 1974. 5 refs. (June 5-8.)*

The scientific problems, technological difficulties, and costs, characteristic of the installation and operation of a large automated air pollution monitoring network, require a profound study of the concept and the system proper before a final choice is made. This, together with the changing nature of air pollution, the broadening of scientific knowledge, and the improvement in the technology of monitoring, were adequate reasons for the Nuclear Research Center in Mol, Belgium, to construct a pilot net in order to have a scale model and research unit where a wide range of problems could be simulated, studied, and solved in a flexible and dynamic way. The first steps toward the realization of the objectives have been made. These objectives and their realization are described. The measurement of meteorological parameters, the computer facilities, the software for data acquisition, the software for the central computer, and the monitors for dust and gaseous pollutants are described. (Author conclusions modified)

42685 **APTIC NO. 65988**

Kruizinga, S.

EVALUATION OF MEASURED SO2 CONCENTRATION BY TRANSFORMING TO A PROBABILITY VALUE. *Autom. Air Qual. Monit. Syst., Proc. Conf. Bilthoven, Netherlands, 1973, p. 235-250, 1974. (June 5-8.)*

By transforming the measured sulfur dioxide concentrations of all measuring stations to the probability of finding a lower concentration at that station, a quantity is obtained, called Probability Measure, which shows a simple spatial relation. This Probability Measure (PM) shows a reasonable correlation with a Meteorological Index for the dispersion of pollutants. It is therefore possible to use this PM as an indicator for atmospheric dispersion. It is proposed to use this PM for the indication of interesting situations for further meteorological analysis. With some slight modifications, it is also possible to use this PM for a short-term on-line processed warning system. The system described was tested with the help of SO2 measurements from the network of Openbaar Lichaam Rijnmond in the Netherlands. (Author conclusions modified)

42686 **APTIC NO. 65979**

Kumazawa, Y.

ENVIRONMENTAL POLLUTION CONTROL SYSTEM AND THE PERIPHERAL DEVICES. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 23-35, 1974. (June 5-8.)*

An environmental pollution control system and its peripheral devices are described. The system consists of telemetering and computer systems. It conducts continuous monitoring and takes emergency measures. The telemetering system transmits the measured data from individual monitoring stations to the central surveillance room in the control center by wire or wireless, and the computer system functions to arrange, collect, summarize, maintain, and store these data and to display or print them out. The actual activities required for environmental pollution inspection include provision of information for the public, pollution forecasting, mass communication, monitoring emission sources, and large-scale computation. The functions of environmental pollution watch systems are reviewed. The levels of pollutants which necessitate the declaring of various alarm levels are listed.

42687 **APTIC NO. 66391**

Lepper, James M., Jr.

DILUTION SYSTEM FOR PARTICLE ANALYZER. *(Wehr Corp., Milwaukee, Wis.) U. S. Pat. 3,791,196. 5p., Feb. 12, 1974. 2 refs. (Appl. March 22, 1972, 10 claims).*

An airborne particle analyzer dilution system is described which, unlike prior art dilution devices, results in virtually no disruption of the physical characteristics of the sample. The dilution adapter receives clean exhaust air, which would otherwise be discharged into the ambient air, and directs the clean air to the injector through which the aerosol sample is also directed into the sensing area of the analyzer. The adapter has an adjustable exhaust to permit discharge to the ambient air of a measured portion of the clean air so that a corresponding volume of new sample is drawn into the unit. The sample aerosol is injected into the center of the continuously circulating air in the unit directly at the sensing area. Regulation of the amount of fluid discharged into the ambient air provides control over the amount of sample introduced into the unit for entrainment with the clean circulating air and, correspondingly, the degree of sample dilution. (Author abstract modified)

42688 **APTIC NO. 66423**

Leschonski, Kurt, Wulf Alex, and Bernd Koglin

PARTICLE SIZE ANALYSIS. SEPARATION METHODS. 6. SEPARATION LIMITS AND RESOLUTION OF ANALYTICAL SEPARATION PROCESSES. *(Teilchengroessenanalyse. 6. Trennverfahren. Trenngrenze und Trennschaerfe von Analysentrennungen). Text in German. Chem.-Ing.-Tech., 46(19):821-824, 1974. 12 refs.*

The discussion of particle size analysis is continued by reviewing separation methods. First the separation limits and selectivity of analytical separations are discussed. A description of sieve analysis, sieve standards, testing of sieves, the influencing parameters of sieve analysis follows. Manual and mechanical sifting machines are enumerated.

42689 **APTIC NO. 65760**

Levaggi, D. A., R. Zerrudo, G. Karels, W. Oyung, and M. Feldstein

AN INTEGRATED MANUAL IMPINGER METHOD FOR THE SIMULTANEOUS DETERMINATION OF NOX AND SOX IN SOURCE EFFLUENTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1974. 7 refs. (Presented at the Air Pollution Control Association Annual Meeting, Denver, Colo., June 9-13, 1974, Paper 74-192.)*

A manual procedure is outlined which utilizes an alkaline permanganate sampling train for the simultaneous collection of nitrogen and sulfur oxides from stationary sources. It is dependent on anticipated concentrations and samples of up to an hour duration may be taken. For NOx, the formed nitrites of collection are converted to nitrates. The total nitrate is then reduced to nitrite, diazotized and coupled to form a red dye using a commercially available ready made reagent. The SOx are determined by the turbidimetric barium sulfate procedure. Data are shown comparing the proposed method from numerous types of emission sources, both with accepted methods and newer instrumental techniques. The ability to sample simultaneously for NOx and SOx has many advantages: it is applicable to power plants, boiler, and other sources where both gases are of interest for compliance and/or source inventory purposes. (Author abstract modified)

42690 **APTIC NO. 66355**

Lucero, D. P. and J. W. Paljug

MONITORING SULFUR COMPOUNDS BY FLAME PHOTOMETRY. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:20-35, 1974. 14 refs. (Presented at the Instrumentation for Monitoring Air Quality Symposium, Boulder, Colo., Aug. 14-16, 1973.)*

The operation of a sulfur flame photometric detector (FPD) is based on the chemiluminescence of an activated molecular sulfur species produced by a hydrogen hyperventilated diffusion flame. A predictable detector response is obtained from a gas molecule in proportion to the number of sulfur atoms it contains. A FPD sulfur analyzer is comprised of an FPD and photomultiplier tube assembly, a pneumatic sampling and flow control network, and a signal conditioning and electronic subsystem. The analyzer output can assume three basic forms which provide sensitivity for ppb level analysis, broad dynamic range, or convenient readability. The FPD analyzers are used extensively for laboratory analysis and ambient and area monitoring. By a continuous sample conditioning procedure, the analyzer can be used for source monitoring and on-stream process analysis. The instrument can be used to measure sulfur compounds such as sulfur dioxide or hydrogen sulfide. (Author abstract modified)

42691 **APTIC NO. 66360**

Luis, P. and C. N. Carducci

IDENTIFICATION OF SULFUR DIOXIDE BY CAPILLARY METHODS. NEW REAGENTS FOR SULPHUR DIOXIDE, HYDROGEN SULFIDE, AND OTHER REDUCING GASES. *Mikrochim. Acta, 1974(5):839-848, 1974. 16 refs.*

The classical tests for sulfur dioxide have been adapted to the capillary technique. Chlorate, bromate, and a redox indicator in a weak acid medium are excellent reagents for detecting sulfur dioxide and other reducing gases. A specific test for hydrogen sulfide is also proposed. Special capillary techniques for tests which require reagents fixed on strips of filter paper have been developed.

42692 **APTIC NO. 66416**

Makiyenko, E. V. and I. E. Naats

ON THE SELECTION OF THE REFRACTIVE INDEX IN THE STUDY OF THE MICROSTRUCTURE OF ATMOSPHERIC AEROSOL BY OPTICAL METHODS. *(K vyboru pokazatelya prelomleniya pri issledovanii mikrostruktury atmosfernogo aerozolya opticheskimi metodami). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 10(5):543-551, 1974. 5 refs.*

A mathematical method for the a priori selection of the refractive index relative to the real refractive index is presented. The refractive index is used for the study of the microstructure of atmospheric aerosols by the measurement of optical characteristics, e.g., of the attenuation factors of aerosols. High accuracy in the optical measurements also requires high accuracy of the a priori determined refractive index.

42693 **APTIC NO. 62872**

Malygina, Y. F. and V. A. Tsendrovskaya

DETERMINATION OF SODIUM PENTACHLOROPHENOLATE IN THE AIR BY THIN-LAYER CHROMATOGRAPHIC METHOD. *(Opredeleniye pentakhlorofenolyata natriya v atmosfernom vozdukhe metodom tonkosloynoy khromatografii). Text in Russian. Gigiena i Sanit., no. 3:71-72, 1974. 1 ref.*

A thin-layer chromatographic method for the determination of the in-the-air concentrations of sodium pentachlorophenolate, a highly toxic substance with a maximum allowable concentration of 0.0009 mg/cu m, used as a fungicide and antiseptic in polymer production, is described. The method is based on the substitution reaction between sodium pentachlorophenolate and silver on thin layer of silica gel. Air is sampled for the determination for up to 6.5 hrs at a rate of 2 l/min, through ethanol as absorbent. The sample is eluted with a 3:2 ratio of dioxane and methanol, after which the silica gel layer is dried and sprayed with silver nitrate, ammonium solution, and acetone for visualization in UV light. The spots appearing are of dark gray color, the Rf value being 0.4. The sensitivity is 0.7 micrograms.

42694 **APTIC NO. 66524**

Matthews, B. J. and C. W. Lear

APPLICATION OF HOLOGRAPHIC METHODS TO THE MEASUREMENT OF FLAMES AND PARTICULATE, *VOLUME II (FINAL REPORT). TRW Systems Group, Redondo Beach, Calif., Environmental Protection Agency Contract 68-02-0603, TRW Proj. 23523-6001-Tu-00, Program Element 1AB014, EPA-650/2-74-031-b, 23523-6001-Tu-00, ROAP 21ADG-51, 11982, 121p., April 1974. 17 refs.*

NTIS: PB-235 675/AS

The feasibility of applying pulsed ruby laser holographic techniques to the measurement of particulate in the 1 micron and sub-micron size range was investigated. A scattered light holocamera was developed and the effects of particle size, angular illumination of the particle, particle number density, and incident laser beam diameter were evaluated. The mathematical and physical models from which the transformation can be made from a scattered light distribution to a particle size distribution were examined. The advantages and limitations of certain promising scattered light holographic methods were assessed. (Author abstract modified)

42695 **APTIC NO. 66122**

Max, E. and L. -G. Rosengren

CHARACTERISTICS OF A RESONANT OPTO-ACOUSTIC GAS CONCENTRATION DETECTOR. *Opt. Commun., 11(4):422-426, Aug. 1974. 11 refs.*

An acoustically resonant opto-acoustic gas concentration detector is described, with experimentally obtained parameter values obtained being compared to theoretically expected values. The detector consists of an encapsulated cylindrical tube in the middle of which laser radiation is propagated. The tube if furnished with infrared-transmitting potassium chloride windows, the radiation being passed through the end faces. Mathematical expressions are given for calculating the acoustic resonance frequencies of the cylindrical space inside the detector, with pressure variations being detected by a microphone combined with a pre-amplifier. The minimum detectable gas concentration is determined chiefly by noise originated from the microphone and the pre-amplifier and by acoustic noise detected by the microphone. Measurements of microphone pre-amplifier output are shown as a function of ammonia gas concentration and give close agreement with theoretically expected values. Concentrations expressed in an equivalent gas absorption strength down to about 0.0001 ppm for NH3 gas appear possible with the present detector by better control of the acoustic noise and by subtraction of the background signal. The detector appears to be very useful as a laser air pollution monitoring device.

42696 **APTIC NO. 66318**

Mitchell, William J. and M. Rodney Midgett

AN EVALUATION OF THE PRECISION CAPABILITIES OF THE EPA PARTICULATE SAMPLING TRAIN. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Methods Standardization and Performance Evaluation Branch, 32p., July 1974. 7 refs.*

A ganged train sampling arrangement, which is a new technique for evaluating the reliability of the sampling methods used to characterize stationary source emissions, was used to estimate the intertrain agreement that can be obtained using the Method 5 particulate sampling train. Sixteen sampling runs, in which four particulate trains simultaneously sampled at nearly the same point in the stack, showed that the EPA Method 5 particulate sampling train is capable of giving reproducible results. The within-run variations were correlated with the changes in the magnitude of the particulate concentration being measured. No correlation was detected between the within run via variation and either the sampling time or the volume of gas sampled. An estimate is made of the precision associated with the condenser technique for determining the moisture content of the stack gases. (Author abstract modified)

42697 **APTIC NO. 66143**

Morgan, A.

ADSORPTION OF HUMAN SERUM ALBUMIN BY ASBESTIFORM MINERALS AND ITS APPLICATION TO THE MEASUREMENT OF SURFACE AREAS OF DISPERSED SAMPLES OF CHRYSOTILE. *Environ. Res., 7(3):330-341, June 1974. 11 refs.*

The adsorption of protein by various asbestiform minerals was measured using iodine-131 labelled human serum albumin. The amount of albumin adsorbed by chrysotile was very dependent upon the degree of dispersion of the material and tended to a maximum of about 70 mg/g for fully opened samples at an equilibrium concentration of 0.1 mg/ml. Removal of magnesium from chrysotile by acid leaching produced a progressive decline in its affinity for protein. Calculations of the surface area of dispersed chrysotile, based on the amount of albumin adsorbed, corresponded quite well with measurements of surface area by nitrogen adsorption. Albumin adsorption provides a simple and convenient technique for characterizing the degree of dispersion of chrysotile in suspension. The affinity of albumin for amphiboles is less than for chrysotile; by contrast, dispersion by shaking or ultrasonic treatment produces little change in uptake. (Author abstract)

42698 **APTIC NO. 66356**

Neuscheler, R. C.

SELECTION OF CONTINUOUS SULFUR DIOXIDE MONITORS FOR AMBIENT AND SOURCE CONCENTRATION LEVELS. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:9-19, 1974. 21 refs. (Presented at the Instrumentation for Monitoring Air Quality Symposium, Boulder, Colo., Aug. 14-16, 1973.)*

Each sulfur dioxide monitoring situation possesses characteristics which may imply the selection of a particular SO2 detection principle. Total sample concentration, SO2 concentration range, measurement accuracy, and available manpower to operate and maintain equipment are used as criteria to select a general method of detection from which a specific monitor may be chosen. A table is given listing principle methods of continuous SO2 detection and their basic characteristics, advantages, and disadvantages. The methods discussed include colorimetry, conductivity, coulometry and amperometry, electrochemical sensor or transducer, flame photometry, and nondispersive infrared photometry, ultraviolet absorption spectrometry (dispersive), second derivative spectrometry, and ultraviolet correlation spectrometry. Technical problems of source level SO2 monitoring are discussed, and the concept of a complete source sampling and analyzing system is proposed. (Author abstract modified)

42699 **APTIC NO. 66130**

Novotny, M., M. L. McConnell, and M. L. Lee

SOME ASPECTS OF HIGH-RESOLUTION GAS CHROMATOGRAPHIC ANALYSES OF COMPLEX VOLATILE SAMPLES. *J. Agr. Food Chem., 22(5):765-770, Sept. 1974. 43 refs. (Presented at the American Chemical Society Symposium on Computers in Flavor Chemistry, 166th National Meeting, Chicago, Ill., Aug. 1973.)*

High resolution gas chromatographic analysis of complex volatile samples is reviewed in terms of chromatographic profile methods, the combined use of gas chromatography and mass spectrometry, sampling procedures, capillary gas chromatography, simplification of chromatographic profiles, and computer-aided data evaluation. Efficient coupling of high resolution glass capillary columns with mass spectrometers allows identifications to be conducted on nanogram quantities of volatile samples, while computers can be used to analyze complex chromatograms containing up to several hundred constituents and to compare chromatograms with stored spectra. Both extraction and headspace sampling techniques may be used to prepare samples of volatiles for analysis, with significant advances in headspace sampling methods providing for rapid evaluation of headspace fingerprints for routine purposes. Simplification of chromatographic profiles can be achieved by the use of column-switching techniques, subtractive precolumns, and the use of selective detectors.

42700 **APTIC NO. 63165**

Obraztsova, Y. N., V. A. Shorina, and V. P. Volosatova

EXPRESS METHOD FOR THE DETERMINATION OF MERCURY VAPOR CONCENTRATIONS IN THE AIR. *(Ekspressnyy metod opredeleniya kontsentratsii rtutnykh parov v vozdukhe). Text in Russian. Gigiena i Sanit., no. 4:62-63, 1974.*

A simple, rapid method for the determination of mercury vapor concentrations in the air is described. Air containing mercury vapors is sampled at a rate of 3 l/min for 30 min through an indicator paper treated with copper iodide and mercury iodide. In the presence of mercury vapors, the indicator shifts its color to yellowish-orange. The mercury vapor concentration is determined by comparing the color of the spot obtained with a standard scale. This method is suitable for the determination of mercury vapors in air in a concentration range of 0.002-0.03 mg/cu m.

42701 **APTIC NO. 66403**

Oikawa, Kikuo, Yoshikazu Hashimoto, and Saburo Yanagisawa

MEASUREMENT METHODS OF METALS IN ATMOSPHERIC PARTICULATE MATTERS. *(Taiki fuyu ryushijo busshitsuchu no kinzoku siebun no bunseki hoho). Text in Japanese. Bunko Kenkyu (Res. Spectroscop.), 23(3):111-127, June 1974. 16 refs.*

Methods of sampling suspended particulates, types of filter paper, and various analytical methods for metal components in suspended particulates are discussed. Sampling suction devices can be a rotary compressor or a blower motor (fan motor). The flow quantity can be checked by various types of flow meters utilizing pressure differentials. The sampler can be high volume, middle volume, or low volume. The hi-vol sampler is the easiest to maintain and is most popularly utilized in all countries. However, the copper measurement taken from the samples captured by this method is totally unreliable due to the roter friction and scattered copper. The middle volume sampler had never been used in Japan, but was developed as a new standard sampler and will gradually replace the use of hi-vol in Japan. The filters discussed are glass wool filter papers by various manufacturers, cellulose paper, membrane, and polystyrene products. The variations of metal components found in various manufacturers filter papers are compared in a table. Various physical properties of different products are compared. Only glass fiber papers are applicable to spectrophotometry though not to neutron activation or X-ray fluorescence. Among the glass filter papers, Whatman No. 41 has the least amount of impurity, though this is not used often for air filter because of its low filter efficiency. As analytical methods, emission spectroscopy, atomic absorption spectrophotometry, neutron activation analysis, fluorescence X-ray, and methods for reagents preparation are discussed.

42702 **APTIC NO. 66571**

Penkala, Stanley J.

SENSATION AND DESCRIPTION OF ODOR. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 16-26. 12 refs. (March 7-8.)*

The physiological phenomenon of odor sensation is reviewed in terms of existing theories of the human olfactory process. No existing theory appears to describe the sensation process sufficiently well to identify the pleasurability and character of an unknown odorant material from data on its molecular structure or the perceived intensity which will result from a specified concentration of the material in pure air. A proportionality constant relates the perceived intensity of odor to some function of the concentration, and each odorant chemical has its respective proportional constant. Using the logarithmic law, representing the range of concentration by orders of magnitude, the perceived intensity can be related to a scale from zero (threshold concentration) to five (very strong). The sensitivity of the human receptor does determine how intense the perceived odor is for a given concentration, and this information is useful in formulating a control strategy.

42703 **APTIC NO. 66402**

Pupp, Christian, Robert C. Lao, John J. Murray, and Roswell F. Pottie

EQUILIBRIUM VAPOUR CONCENTRATIONS OF SOME POLYCYCLIC AROMATIC HYDROCARBONS, AS406 AND SEO2 AND THE COLLECTION EFFICIENCIES OF THESE AIR POLLUTANTS. *Atmos. Environ., 8(9):915-925, 1974. 26 refs.*

The saturated or equilibrium vapor concentrations of the following inorganic substances and polycyclic aromatic hydrocarbons are reported: selenium dioxide (SeO2), pyrene, benzo(a)anthracene (B(a)A), benzo(a)pyrene (B(a)P), benzo(e)pyrene (B(e)P), benzo(k)fluoranthene (B(k)F), benzo(ghi)pyrene (B(ghi)P), coronene, and arsenic oxide (As4O6). The significance of these results with respect to the efficacy of collection of these pollutants on particulate filters and the validity of the previous measurements of collection efficiency are considered in detail. Significant losses may be expected for some of these compounds (As4O6, SeO2, pyrene, and B(a)A); the efficacy of collection is subject to considerable question for some others (B(a)P, B(e)P, and B(k)F), although losses may be minimized by adsorption effects; and for others (B(ghi)P, coronene) losses should be insignificant. Thus, the volatility of some of the compounds prevents their complete collection by particulate filters and causes loss after collection which can prevent accurate measurement of these compounds during air pollution surveys. (Author abstract modified)

42704 **APTIC NO. 66412**

Rath Robert and Dieter Pohl

PARTICLE SIZE DETERMINATION WITH THE COULTER-COUNTER. *(Teilchengroessenbestimmung mit dem Coulter-Counter). Text in German. Staub, Reinhaltung Luft, 34(8):292-294, 1974. 7 refs.*

The Coulter counter counts and measures particles with diameters between 0.5 and 800 micron. The particles are suspended in an electrolyte containing two electrodes which are separated by a wall with circular opening whose diameter is only slightly larger than the maximum particle diameter. If an non-conductive particle crosses the opening, the electric resistance between the two electrodes rises. This increase is higher the larger the particle size is. The ensuing voltage impulse is recorded and used for counting the passing particle as well as for determining the equivalent diameter. The magnitude of the resistance changes for cylindrical and spherical particles is calculated.

42705 **APTIC NO. 66362**

Riediger, Guenther

THE USE OF THE ANDERSEN CASCADE IMPACTOR FOR INDUSTRIAL HYGIENE MEASUREMENTS, PARTICULARLY FOR THE DETERMINATION OF THE EFFICIENCY OF FRACTIONAL SEPARATION. *(Ueber den Einsatz des Andersen-Kaskadenimpaktors in der gewerbehygienischen Prueftechnik, speziell zur Bestimmung des Fraktionsabscheidegrades). Text in German. Staub, Reinhaltung Luft, 34(8):287-291, Aug. 1974. 12 refs.*

The degree of fractional separation of dust separation systems gives more information on the separation capacity than the degree of total separation. The use of the Andersen cascade impactor, which is a dust collector fractionating the particles in nine classes according to the aerodynamic particle diameter, makes it possible to determine the degree of fractional separation in a simple way and with accuracy which is sufficient for many practical purposes. The calibration of the impactor and some practical measurements of the particle size distribution and the fractional separation capacity of a microscreening plate are discussed.

42706 **APTIC NO. 66370**

Rothe, K. W., U. Brinkmann, and H. Walther

REMOTE MEASUREMENT OF NO2 EMISSION FROM A CHEMICAL FACTORY BY THE DIFFERENTIAL ABSORPTION TECHNIQUE. *Appl. Phys., 4(2): 181-182, July 1974. 4 refs.*

The remote measurement of nitrogen dioxide emission from a chemical factory by the differential absorption technique is described. The concentration was measured in the plume at a distance of 300 m from the exit of the stack, thus enhanced NO2 signals are to be expected in several channels. A typical NO2 profile is illustrated. For these measurements the signals of about 200 laser pulses were averaged. The pulse energy was 1 mJ. The repetition rate of the laser was 1 Hz. The experimental values of the different channels are connected by arbitrary curve. Spatial integration along the profile leads to the emission concentration at the exit of the stack. The value of 1170 ppm obtained in this manner is in reasonable agreement with direct measurement results obtained from the factory.

42707 **APTIC NO. 65759**

Salo, Albert E., William L. Oaks, and Robert D. MacPhee

MEASURING THE ORGANIC CARBON CONTENT OF SOURCE EMISSIONS FOR AIR POLLUTION CONTROL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 6 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-190.)*

Total combustion analysis (TCA) was developed as a standard means of measuring carbon dioxide derived from organic carbon and distinguishing inherent carbon monoxide and CO2 which may also be in the original sample. A sample is collected at the source into an evacuated tank preceded in tandem by a cold trap immersed in powdered dry ice. The flow rate is regulated; pitot and temperature measurements are made. The lighter components pass as gases through the trap and into the tank. Gaseous substances from the tank are separated on a chromatographic column, eluting, in order: CO, methane, and CO2. Carrier gas flow is then reversed and non-condensed organic compounds other than CH4 are eluted off of the column as backflush. Condensed organic material from the trap is evaporated in an electrical furnace and combusted with oxygen. All resulting vapors are passed through oxidizing furnaces to assure conversion to CO2 and are measured by non- dispersive infrared. Total organic carbon is calculated by summing the values obtained for CH4, backflush, and trap condensate. The analytical details are described.

42708 **APTIC NO. 66369**

Schuetz, Alfred and Wilfried Coenen

FINE DUST: DEFINITION - MEASUREMENT METHODS. *(Feinstaub: Definition - Messverfahren). Text in German. Staub, Reinhaltung Luft, 34(9):323-326, Sept. 1974. 12 refs.*

In the determination of the threshold limit values for respirable dust, the definition of the term respirable dust was based on the so-called Johannesburg separation function. This separation function is explained in detail; its 50% value lies at an aerodynamic diameter of 5 micron. In measurement methods for the determination of the concentration of respirable dust the separation of the respirable dust fraction should occur during sampling in accordance with this defined separation function. In principle, the separation can be achieved by sedimentation, centrifugal force, or inertial force. The suitability of these separation methods is investigated with different instruments for the measurement of respirable dust. For the extreme particle size distribution the values for respirable dust concentration are related to one another, and the conversion factors and dispersion factors for the individual measurement methods are derived.

42709 **APTIC NO. 66312**

Shendrikar, A. D. and James P. Lodge, Jr.

MICRODETERMINATION OF AMMONIA BY THE RING OVEN TECHNIQUE AND ITS APPLICATION TO AIR POLLUTION STUDIES. *Preprint, National Center for Atmospheric Research, Boulder, Colo., 15p., 1974 (?). 25 refs.*

A ring oven technique for the determination of traces of ammonia in air is described along with an NH3 air sampling technique. A filter paper is placed on the ring oven maintained at about 95 C, and an appropriate volume of standard ammonium solution or sample is added at the center of the paper and washed to the ring zone using two portions of distilled water. After complete drying of the ring, 30 microliters of 5% o-phthaldicarboxylaldehyde solution are added, with the reagent being washed to the ring with ethanol. Distilled water is then used to elute 15 microliters of 0.1 M sodium hydroxide solution to the ring. The filter is finally washed in running tap water, pressed between filters to remove excess water, and air dried for subsequent comparison of the intensity with that of standard rings. The limits of detection is 0.05 micrograms of nitrogen, with a range for quantitative determination of 0.1-1.00 micrograms of N. The method is free of any interferences that are of significance in air pollution studies. Air sample analytical data are presented from a test of the method.

42710 **APTIC NO. 61745**

Shibuya, Masao

APPLICATION OF ACTIVATION ANALYSIS TO DETERMINATION OF POLLUTANTS. *(Kankyo osen busshitsu no bunseki ni okeru hoshaka bunseki gijutsu no riyo). Text in Japanese. Aisotopu Nyuzu (Isot. News), no. 235-2-4, 1974. 9 refs.*

The use of activation analysis in the determination of air pollutants easily analyzed trace elements present in a very small quantity of a test sample which conventional methods failed to detect. An example of the application of method to the determination of air pollutants is the work of Mamuro in which the regional differences in the element concentration in the air of the Osaka area was examined by the determination of the concentration by weight of 31 elements by activation analysis for floating dust samples collected continuously day and night in 1971 and 1972 and for 16 metal elements in dust from jet engines, soot attached to the engine, and dust in the air in and around airports. Activation analysis is useful for the determination of trace pollutants such as substances attached to the surface of leaves and the black spot portion of plants, as well as usual pollutants, and permits the simultaneous analyses of many kinds of elements present in a sample. And a combined method of the gamma-ray spectrometry using the Germanium (Lithium) detector and the spectrum analysis using the computer enables one to analyze many samples in great quantities. The Atomic Reactor Laboratory of Kyoto Univ. has launched a technical study society for the activation analyses of environmental samples.

42711 **APTIC NO. 66496**

Shultz, J. L., A. G. Sharkey, Jr., R. A. Friedel, and Benjamin Nathanson

MASS-SPECTRAL STUDIES OF AIRBORNE PARTICULATES AND POSSIBLE POLLUTION SOURCES. *Biomed. Mass Spectr., vol. 1:137-141, 1974. 8 refs.*

The organic material in airborne particulate matter was investigated by high resolution mass spectrometry to determine if hydrocarbons typical of major sources of pollution can be detected. Carbon number distributions and hydrogen-to-carbon ratios of components found in airborne particulate samples and the corresponding data for compounds detected in fuel combustion products showed great similarity. Samples collected near large power stations and major airports were compared with typical urban particulate samples. Particulates collected from jet engine exhaust and a condensate from the stack effluent from a coal-fired combustion system were studied. Mass spectral data were obtained for an auto exhaust tar, a coal pitch, and several fuels. The mass spectra of two total particulate samples, compared to the spectrum of an ether extract of the organic matter indicated that direct vaporization can be used and extraction is not essential for qualitative mass spectral studies. (Author abstract modified)

42712 **APTIC NO. 66364**

Simons, Wilhelm

DETERMINATION OF THE FUEL-TO-AIR-RATIO AT THE ENGINE COMBUSTION FROM THE ELEMENTAL ANALYSIS OF THE FUEL AND THE CONCENTRATIONS OF CARBON MONOXIDE, CARBON DIOXIDE AND HYDROCARBONS IN THE EXHAUST GAS. *(Ermittlung der Luftzahl bei der motorischen Verbrennung aus der Elementaranalyse des Kraftstoffes und en Konzentrationswerten von Kohlenmonoxid, Kohlendioxid und Kohlenwasserstoffen im Abgas). Text in German. Tue Tech. Ueberwach., 15(9):303-305, Sept. 1974. 1 ref.*

Equations are derived which permit determination of lambda (fuel-to-air ratio) as well as oxygen and nitrogen exhaust gas concentration without measurement of intake air or fuel consumption. Only the concentrations of carbon dioxide, carbon monoxide measured and $C_{16}H_{14}$ in the exhaust gas and elemental analysis of the fuel are used for the calculation. For the presence of hydrogen fractions in the exhaust gas, which change the result slightly, equations are derived for the fuel-to-air ratio and the O_2 and N_2 concentrations. Measurements on 100 automobiles operated according to the European driving cycle were evaluated according to the derived equations.

42713 **APTIC NO. 66353**

Stevens, R. K., Thomas Clark, Ralph Baumgardner, and J. A. Hodgeson

INSTRUMENTATION FOR THE MEASUREMENT OF NITROGEN DIOXIDE. *Am. Soc. Testing Mater. Spec. Tech. Pub., no. 555:44-51, 1974. 9 refs.*

A comparative discussion is given on the operational and response characteristics of colorimetric, chemiluminescent, and electrochemical monitors for ambient nitrogen dioxide. Recent studies demonstrated that ozone is a significant negative interference with the automated colorimetric technique, and details of these studies are given. The latest technology for conversion of NO_2 to nitric oxide for subsequent chemiluminescent detection is discussed. The mechanism of operation and the chemistry involved with newly developed electrochemical monitors for NO_2 are described. (Author abstract)

42714 **APTIC NO. 62803**

Stoeber, W., C. Boose, and V. Prodi

ON THE ORIENTATION AND THE DYNAMIC SHAPE FACTOR OF CHAIN TYPE AEROSOL PARTICLES IN CHARGE SPECTROMETERS. *(Ueber die Orientierung und den dynamischen Formfaktor von kettenfoermigen Aerosolteilchen in Ladungsspektrometern). Text in German. Inst. National de Recherche Chimique Appliquee, Paris (France), Proc. Colloq. Int. Atmos. Polluees, 11th, Paris, France, 1974, p. 18-1-18-19. 25 refs. (May 8-10.)*

Electron microscopic inspection of chain aggregates of submicron latex spheres deposited in a charge spectrometer reveal a preferred orientation of the chain aggregates with their polar axis almost perpendicular to the sampling surface. The polar axis of the aggregates tend towards a position parallel to the electric field, while the aggregates move along the field lines during precipitation. This is supported by the measurement of the dynamic shape factors of the aggregates. These values are slightly higher (less than 10%) and almost proportional to theoretical data available for prolate spheroid of corresponding elongation and orientation. Analogous results are known from a study of centrifugal precipitation where the motion of the chain aggregates tends to be perpendicular to their polar axis. This explains why dynamic shape factors of chain aggregates as obtained in centrifugal and electrical precipitation experiments are significantly different. Values are given for chain aggregates containing up to nine sphere.

42715 **APTIC NO. 66215**

Thomas, T. C. and J. N. Seiber

CHROMOSORB 102, AN EFFICIENT MEDIUM FOR TRAPPING PESTICIDES FROM AIR. *Bull. Environ. Contamination Toxicol., 12(1):17-25, July 1974. 19 refs.*

Chromosorb 102 was investigated as an adsorbent for pesticide vapor collection. Collection efficiencies for a variety of pesticides were determined at vapor concentrations corresponding approximately to 5 ng/cu m to 25 micrograms/cu m. The first 4 g of adsorbent, in the upstream collection tube, trapped essentially all the pesticide vapor in each case. There were little or no losses due to incomplete trapping, revolatilization, or incomplete extraction. Absence of significant chemical degradation was inferred from close examination for minor peaks in the 1gas chromatograms. Essentially the same high collection efficiencies were observed on 5 g of Chromosorb 102 held in a 5 cm diameter filter cup through which the air was sampled at 20 l/pm. In another study, chromosorb 102 was superior to ethylene glycol impingers.

42716 **APTIC NO. 66437**

Trachtenberg, Alan F. and Irwin H. Suffet

EVALUATION OF AN ION SELECTIVE ELECTRODE MONITOR FOR TOTAL OXIDANTS. *J. Air Pollution Control Assoc., 24(9):836-840, Sept. 1974. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami Beach, Fla., June 1972, Paper 72-3.)*

The iodide ion selective electrode has potential use for continuous monitoring of total oxidants in ambient air. Total oxidants can be measured coulometrically or colorimetrically after oxidation of neutral buffered potassium iodide solution (0.6-1.2 M) to free iodine. On the other hand, the iodide electrode method can measure much more dilute solutions (less than 0.0001 M). The iodide electrode measures the disappearance of iodide from the absorbing solution. The detector is made from an iodide electrode, a reference electrode, an expanded scale pH meter, and a millivolt recorder. The iodide electrode shows a constant Nernstian -- 59 mv change per decade over a dilute solution range, although the absolute voltage shows a drift of 1 mv/day. A continuous iodide electrode air monitor was set up and investigated for ambient monitoring. Operational parameters such as air and solution flow rates and electrode parameters such as response time at different iodide concentrations were investigated. Statistical comparison was made with a Beckman colorimetric total oxidant monitor and a prototype REM chemiluminescent ozone monitor. The iodide electrode monitor was capable of continuously monitoring oxidants in the atmosphere and was sensitive to changes in ambient concentrations. (Author abstract)

42717 **APTIC NO. 66229**

Tucker, Armin W., Milton Birnbaum, and Curtis L. Fincher

FLUORESCENCE OF FLY ASH SAMPLES: IMPLICATIONS FOR IN SITU AND REMOTE DETECTION. *J. Lumin., 9(1):1-8, May/June 1974. 10 refs.*

A study of the fluorescence spectra of fly ash samples from different sources indicates that each sample has a characteristic fluorescence and excitation spectrum which can be used to identify and monitor its presence. Fluorescence lifetime studies of two different samples also demonstrate characteristics which can be used for identification. The technique shows ample sensitivity for the determination of particulates suspended in air and should be useful for in situ and remote monitoring applications. Wavelengths of maximum fluorescence and relative intensities are tabulated for several samples at 4580 and 3600 Angstroms excitation. (Author abstract modified)

42718 **APTIC NO. 66208**

Uehara, Hiromichi, Mitsutoshi Tanimoto, and Yasuhara Ijuuin

A STARK-SWEEP MICROWAVE CAVITY SPECTROMETER FOR ZEEMAN EFFECT STUDIES AND FOR POLLUTANT MONITORING. *Chem. Phys. Letters (Amsterdam), 26(4):578-581, June 15, 1974. 14 refs.*

A microwave cavity spectrometer of the Stark-dc-coltage sweep type with a fixed resonance frequency in the X-band region is described along with its application to the study of the Zeeman effect in molecules and air pollutant monitoring. The Stark electrode, 35 mm in length and 19.5 mm in width, is placed at the center of the cavity perpendicularly to the microwave electric field. The electrode is supported by Teflon strips on which guiding grooves are milled. A 3 mm gap between the shorter edge of the Stark plate and a cavity and plate which has a coupling iris is wide enough for microwaves to penetrate completely into both sides of the Stark electrode. The cavity is electroplated with silver and flashed with gold. The resonant microwave frequency is monitored with a frequency divider and an electronic counter. Spectra are given for detection of formaldehyde of 10 ppm concentration in automobile exhaust and indicate a sensitivity almost comparable with that of a conventional microwave spectrometer equipped with an absorption cell of a few meters in length.

42719 **APTIC NO. 66361**

Verduyn, Geert and Alain Derouane

AUTOMATIC DETERMINATION OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD. APPLICATION TO THE DETERMINATION OF SO2 IN THE AIR AND OF SULFATES IN RAINWATER. *(Dosage automatique des sulfates par une methode nephelometrique amelioree. Application au dosage du SO2 dans l air ambiant et des sulfates dans les de pluie). Text in French. Atmos. Environ., 8(7):707-715, July 1974. 15 refs.*

An automatic nephelometric method for the determination of low concentrations of sulfate is described. It permits the determination of concentrations as low as 0.1 micrograms cm to the minus 3rd power. The sulfate ions are precipitated by barium perchlorate. Fifty samples can be analyzed per hour. This method was developed for the determination of sulfur dioxide in air after absorption in diluted hydrogen peroxide. It is also applicable to the determination of sulfate amounts in rain water. The Technicon Auto Analyser connected with a two monochromators spectroflorimeter is used.

42720 **APTIC NO. 66131**

Villalobos, R. and R. L. Chapman

A GAS CHROMATOGRAPHIC METHOD FOR AUTOMATIC MONITORING OF POLLUTANTS IN AMBIENT AIR. *Chimia, 28(8):411-417, Aug. 15, 1974. 22 refs.*

A gas chromatographic method suitable for the automatic monitoring of airborne methane, ethylene, acetylene, carbon monoxide, and total hydrocarbons is described which has a sensitivity of 1 ppm or better for carbon monoxide and individual hydrocarbons and 200 ppb for total hydrocarbons based on a detector sensitivity of 0.3 coulombs per gram atom of carbon. The method eliminates the need for an inert carrier gas and thereby significantly reduces compressed gas requirements for continuous unattended operation. A nickel catalyst methanator is used to convert CO to methane for detection by the flame ionization detector, and pure hydrogen carrier gas simultaneously satisfies the hydrogen requirements of the methanator and the fuel requirements of the FID. Total hydrocarbon measurement is accomplished by a modification of the conventional continuous hydrocarbon analyzer technique. The use of air carrier completes the requirements for optimum FID operation, and an internal catalytic oxidizer removes traces of hydrocarbons in the air carrier to provide a true zero-hydrocarbon reference level. Carrier air and FID combustion air can also be supplied by the sample pump with an external combustion tube to remove hydrocarbons, and hydrogen can be supplied by an electrolytic generator, thus eliminating the need for cylinders of compressed gases which must be frequently replenished. (Author summary modified)

42721 **APTIC NO. 66216**

Volz, F. E.

ECONOMIC MULTISPECTRAL SUN PHOTOMETER FOR MEASUREMENTS OF AEROSOL EXTINCTION FROM 0.44 MICRON TO 1.6 MICRON AND PRECIPITABLE WATER. *Appl. Opt., 13(8):1732-1733, Aug. 1974. 5 refs.*

A economical multispectral sun photometer was developed for measurements of aerosol extinction from 0.44 micron to 1.6 micron and precipitable water. The wavelength range extends to the infrared because of increased interest in global monitoring of turbidity. Silicon detectors operated in the photovoltaic mode are used instead of selenium photocells. This completely eliminates the problems of nonlinearity of response, reduced sensitivity drifts, and temperature coefficients and allows measurements to lambda approximately equal to 1 micron. Calibration of the photometer and evaluation of measurements are based on the short and long term stability of the detectors. The accuracy and reproducibility of the readings is in the order of 2% as determined as routine intercomparison of instruments for calibration purposes.

42722 **APTIC NO. 66587**

Warner, Peter O., James O. Jackson, Mary Louise Bird, and Larry Saad

RECENT ADVANCES ON ODOR MONITORING: A RAPID METHOD FOR SOURCE MEASUREMENT OF ODOR LEVELS USING A MODIFIED ASTM DILUTION METHOD. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974. p. 204-213. 8 refs. (March 7-8.)*

Two rapid dilution methods for source odor determination are compared with the American Society for Testing and Materials method D 1391. The first procedure involving a successive single syringe system consists of presenting successive dilutions of the odorous material to a five member odor panel until at least 60% of the members have recorded two successive negative olfactory responses. The second procedure involving a random multi-syringe system consists of using a master syringe from which all dilution levels are obtained and then presenting 100 ml dilution syringes to each panelist in a random fashion such that only the moderator knows the order of presentation. Both methods compare rather closely with the ASTM method, indicating the usefulness of the proposed procedures in at least preliminary odor screening as might be dictated by municipal odor regulations or community nuisance ordinances. Gas chromatographic analysis of the same odors suggests the possible use this analytical method for evaluating industrial odors once the most odor-related peaks are identified.

42723 **APTIC NO. 66523**

Witte, A. B. and D. E. Haflinger

APPLICATION OF HOLOGRAPHIC METHODS TO THE MEASUREMENT OF FLAMES AND PARTICULATE, VOLUME I (FINAL REPORT). *TRW Systems Group,* *Redondo Beach, Calif., Environmental Protection Agency Contract 68a02-0603, Program Element 1AB014, Rept. EPA-650/2-74-031-a, ROAP 21ADG-51, 11982, 23523-6001-TU-00, 68p., April 1974. 6 refs.*

NTIS: PB-235 674/AS

A pulsed ruby laser holographic interferometer was used to study flames and extract temperature profile data. The interferogram is recorded holographically presenting a three dimensional record of the interference fringe pattern. The density profile and the temperature profile can be calculated from the fringe shift information. Data are presented for a methane-air burner operating both as a diffusion flame and as a premixed flame. The large number of fringe shifts recorded on an interferogram complicated the reduction of the methane air data, but the interferometrically derived temperature data was correlated with the thermocouple measurements. (Author abstract modified)

42724 **APTIC NO. 66214**

Wolf, Phillip C.

THE CASE FOR CONTINUOUS MONITORING. *Power, 118(8):59-61, Aug. 1974. 12 refs.*

Incentives for continuous monitoring of combustion gases in utility boilers are discussed. Continuous monitoring uses physical methods of flue gas analysis which permits the operator to maintain the optimum ratio of fuel flow to air flow. If the fuel/air ratio is too high, losses occur due to unburned carbon, usually in the form of carbon monoxide. If the ratio is too low, the combustion gas temperature will drop, reducing overall efficiency and energy release. In addition to oxygen and CO, it may also be necessary to monitor sulfur dioxide and nitrogen oxides emissions, to minimize power plant corrosion, and to meet environmental restrictions.

42725 **APTIC NO. 66424**

Wulf, Alex, Bernd Koglin, and Kurt Leschonski

PARTICLE SIZE ANALYSIS. 5. SEDIMENTATION ANALYSIS (CONTINUED). THEORY AND PROCESS IN CENTRIFUGAL FIELD. *(Teilchengroessenanalyse. 5. Sedimentationsanalyse (Fortsetzung) Theorie und Verfahren im Zentrifugalfeld). Text in German. Chem.-Ing.-Tech., 46(17):729-732, 1974. 16 refs.*

The discussion of particle size analysis by sedimentation is continued. The theory and methods in the centrifugal field (the suspension method and the coating method where at first a thin layer of suspension coats the spin fluid), as well as the formation of streamers and their avoidance are discussed. Analytical centrifuges such as the disk centrifuge by Atherton and Cooper, the centrifugal sedimentation scale by Muschelknautz, and the sedimentation centrifuge by Boewing and Gast are described.

42726 **APTIC NO. 66201**

Wyatt, J. R., J. J. DeCorpo, M. V. McDowell, and F. E. Saalfeld

SIMPLE METHOD FOR ADIABATICALLY SAMPLING REACTIVE GASEOUS SYSTEMS FOR MASS SPECTROMETRIC ANALYSIS. *Rev. Sci. Instr., 45(7):916-919, July 1974. 8 refs.*

The design and use of a flow type reactor tube for adiabatically sampling reactive gaseous systems for mass spectrometric analysis are described. The tube is passed through the ion source of a mass spectrometer permitting the components of a reacting gas phase system to be extracted adiabatically through a 10 micron orifice into the ion source for analysis. The procedure for drilling this orifice with a focused carbon dioxide laser is presented together with data which indicate that the reactive species extracted from a flame zone are representative of those existing within the reactive system. The method is useful for sampling atmospheric contaminants and is currently being used in the study of low temperature combustion processes, particularly those producing cool flames in a dynamic system. (Author abstract modified)

42727 **APTIC NO. 66025**

U. S. Atomic Energy Commission, New York, Health and Safety Lab.

TRACE METALS - PB, V, CU, ZN, CD, CR, MN, NI. *In: HASL Procedures Manual. p. E-00-04-01-E-00-04-02, Aug. 1974.*

NTIS: HASL-300(Suppl. 2)

An atomic absorption spectrometric method is described for the trace analysis of lead, vanadium, copper, zinc, cadmium, chromium, manganese and nickel. The trace metals are prepared in nitric acid solution and diluted to known value, with measurements being performed by an atomic absorption spectrophotometer. Details are provided concerning sample preparation, solubilization, special reagents, and the apparatus used. The method has been tested for precipitation samples, air filters, and tap water.

42728 **APTIC NO. 66026**

U. S. Atomic Energy Commission, New York, Health and Safety Lab.

CHROMATOGRAPHIC DETERMINATION OF SF6 AND CCL3F. *In: HASL Procedures Manual. p. E-00-07-01-E-00-07-08, Aug. 1974.*

NTIS: HASL-300(Suppl. 2)

A chromatographic method is described for the determination of sulfur hexafluoride and trichlorofluoromethane (Freon-11) in pressurized whole air samples, with the limit of detection, without preconcentration, being 3 ppt for SF6 and 10 ppt for CCl3F. The compounds are determined by gas chromatographic separation and are detected by an electron-capture system. The sensitivity is enhanced through concentration by freeze-out in pressurized sampling bombs. Details are given for sample preparation, chromatograph operating conditions, analysis procedure, calibration, special apparatus, and special gases employed.

42729 **APTIC NO. 66245**

COMPLETION OF A STANDARD GAS PRODUCER FOR CALIBRATION OF POLLUTION MEASUREMENT EQUIPMENT. *(Kogai keisokuki kenteiyo hyojin gasu hassei sochi no kansei ni tsuite). Text in Japanese. Kikai Shinko (Promoting Machine Ind. Japan), 7(6):51-52, June 1974.*

With a grant of the Mechanical Engineering Advancement Fund, the New Machinery System Center designed a standard gas producer, and the construction was completed recently and tests were given. The equipment produces accurately and safely desired amounts and flow rate of sulfur dioxide, nitric oxide, nitrogen dioxide, hydrocarbons, and carbon monoxide for the purpose of calibration and correction of pollution measurement equipment. The system comprises high pressure gas units containing highly pure material gases, capillary flow adjustment unit and high efficiency concentration monitor, and a computer system controlling these operations. The machine is able to produce mixed gases continuously without any adsorption or loss. The capacities are 0.1 ppm to 1% of SO2, 0.1 ppm - 1% of NO, 0.1 ppm - 1000 ppm of NO2, 0.1 ppm - 1% of C3H8, 2 ppm - 20% of CO, and other gases with accuracy of + or - 1-1.5%. The flow rate is 0.5 to 10 l/min, and gas pressure is more than 10 mm AqG.

42730 **APTIC NO. 66275**

Environmental Protection Agency, Washington, D. C., Emission Control Technology Div.

EVALUATION OF JAPAN AIRCRAFT MAINTENANCE CO. LTD. DIGITAL FUEL CONSUMPTION METER. *Rept. 74-35 DWP, 7p., May 1974.*

The Japan Aircraft Maintenance Co., Ltd. digital fuel consumption meter was evaluated. The device uses a positive displacement transducing element, which is tied into a digital counter and display. The meter obtained a mean fuel consumption value 3% higher than when compared with the carbon balance technique. The higher average may be associated with evaporative fuel losses which are not measured in the carbon balance technique. The difference in measurement methods ranged from plus 7% to minus 8%. (Author conclusions modified)

1973

42731 **APTIC NO. 66552**

Angerer, J., A. Haag, D. Szadkowski, and G. Lehnert

A NEW METHOD FOR THE ANALYSIS OF ULTRA-MICRO CONSTITUENTS OF AIR. *(Eine neue Methode zur Luftanalyse im Ultraspurenbereich). Text in German. Z. Klin. Chem. Klin. Biochem. (Munich), 11(3):133-134, 1973. 1 ref.*

A new method for the multicomponent analysis of ultra-micro constituents in air is described. The method uses a combination of Kaiser s thermal gradient tube with a gas chromatograph and mass spectrometer. A sample volume of about 2 l is dried and sucked into the Dexsil 300-filled thermal gradient tube cooled by liquid nitrogen. The retained components are subsequently eluted and transferred into the gas chromatographic column, using helium as a carrier gas, and applying a rate of temperature increase of 7.5 C/min from -150 C to 200 C. The separated fractions are sent directly to the separator of the mass spectrometer. The total ion current generated in the flame ionization detector of the mass spectrometer is used for the determination of mass spectra. Analyses of room and street air samples by this method revealed the presence of chloroform, 1,2-dichloroethylene, tetrachloroethylene, toluene, xylene, mesitylene, n-decane, and quinoline.

42732 **APTIC NO. 66322**

Corte, G., G. Dowd, L. Dubois, and J. L. Monkman

EVALUATION OF COMMERCIALLY AVAILABLE MERCURY ANALYZERS. *Preprint, American Chemical Society, 33p., 1973. (Presented at the American Chemical Society, Annual Meeting, 165th, Dallas, Tex., April 8- 13, 1973.)*

Three commercially available mercury analyzers were evaluated. Defects are described in a $10,000 instrument using the Zeeman effect as the basis for a response claimed to be specific to Hg vapor at 2537 A. The second instrument is a split beam photometer operating at the wavelength 2537 A. There is a built-in calibrating filter which simulates an air concentration of 2 ppb Hg, when operating on a continuous sampling basis. Another instrument is a double beam instrument built inhouse, together with sample handling manifold. Palladium chloride scrubbers are used to ensure that the reference cell is kept mercury free.

42733 **APTIC NO. 66325**

Dowd, G., R. S. Thomas, and J. L. Monkman

SENSOR RETENTION TIMES OF AIR POLLUTION MONITORING EQUIPMENT. *Preprint, American Chemical Society, Chemistry Div., 25p., 1973. 8 refs. (Presented at the American Chemical Society, National Meeting, 165th, Dallas, Tex., April 8-13, 1973.)*

Retention times associated with photometric sensors used in air pollution monitoring equipment for nitrogen dioxide, nitric oxide, ozone, and mercury were analyzed. Values of 0.1-0.2 ms or 0.06-0.18 ms were found for load resistors of 1 megohm and anode currents of 1.0-5.0 microamps, depending on whether the step response is integrating or differentiating. Cabling capacity or by-pass condensers increased the retention times to 30 times the sensor level. Three types of signal process integration were analyzed, two of them using field effect input operation amplifiers. The effect of residual voltages on large electrolytic condensers was measured in relation to loading. A circuit component layout for optimizing upper frequency response and minimizing retention time is included. (Author conclusions modified)

42734 **APTIC NO. 66538**

Dowd, G.

ELECTRONIC STANDARDS FOR THE CALIBRATION OF POLLUTION MONITORING EQUIPMENT. *Sci. Total Environ., vol. 2:173-179, 1973.*

Electronic standards for the calibration of pollution monitoring equipment are discussed, with particular reference to photometric systems using phototubes, photovoltaic cells, or photoresistors. A detailed circuit diagram of a standard is illustrated in which a single, three-section vacuum tube, used in the follower mode, supplies current regulation for neon lamps. Each section is equipped with a current control that enables calibration of the standard. One neon lamp energizes the phototube; and, with the anode at a regulated 90 volt potential, current is produced at the output. A second neon lamp energizes a photoresistor whose value changes with lamp intensity, while a third neon lamp energizes a photovoltaic cell which produces a voltage. Line voltage variations are also controlled or corrected for in the power supply for the circuits. Data are graphically illustrated for the anode characteristics of a neon-excited 929 phototube current standard, for the output characteristics of photovoltaic cell voltage standard, and for the ohmic characteristics of a resistance standard developed from a photoresistor.

42735 **APTIC NO. 59442**

Hara, Noboru

THE SIMPLE DETERMINATION OF LEAD IN AIR USING THIN LAYER CHROMATOGRAPHIC PLATE. *Ind. Health, 11(3):155-157, Sept. 1973. 1 ref.*

A simple method for determining airborne lead concentrations in the range of 10-100 ppm is described which employs capture of the metal on filter paper with subsequent development by thin-layer chromatography. The sample is collected on the filter which is then placed in a given volume of buffer solution (pH 2.8) for dissolution of the lead. A portion of the solution is transferred to a small petri dish into which a glass plate containing an ion exchange resin (Amberlite CG-120) and cellulose powder mixture is positioned vertically, approximately 1 mm of its length being submerged. Dipping time is 20 min. The plate is then dried in air and sprayed with a colorimetric solution consisting of 0.04 g of disodium tetrahydroxyquinone in 30 ml of distilled water to which 20 ml of acetone is added gradually. A red stain will appear, its deepness of color corresponding to the concentration of lead in solution.

42736 **APTIC NO. 62377**

Hatakeyama, Hisanao

ATMOSPHERIC ELECTRIC FACTORS AS AN INDEX OF ATMOSPHERIC POLLUTION. *(Osen no shihyo to shite no taiki denki yoso). Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 9:1-6, Aug. 1973. 15 refs.*

The atmospheric electricity and the changes of electric fields and electroconductivity are discussed in general. For examining aerosol pollution, measuring the atmospheric electroconductivity is a more direct method than measuring the electric field. Electroconductivity can be changed, however, by potential gradient changes caused by various factors such as wind, air pressure, or radioactive materials present in the air naturally or artificially. For instance, a change in the wind of pressure can draw out radioactive material in the atmosphere. Nuclear explosions can also cause such changes. The smoke from locomotive engines can also cause changes. Field studies in small city suburbs have shown that meteorological factors have many effects on the electroconductivity of atmosphere, especially in winter. According to published materials, measurements far from artificial emission sources, electroconductivity measurements can be an accurate index for natural aerosol, and in most parts of the earth, the concentration of aerosols have not changed for the last half century, except for three areas: east of the United States in the Atlantic, east of Japan in the northern Pacific, and from India into Northern Indian Ocean.

42737 **APTIC NO. 64619**

Hayakawa, Morihiko, Tetuo Sakai, and Taiki Aoyama

MERCURY CONCENTRATION IN ATMOSPHERE. *(Taikichu no suigin nodo). Text in Japanese. Nagoya-shi Kogai Kenkyusho-ho (Rep. Environ. Pollut. Res. Inst., City Nagoya), no 2:19-21, 1973. 16 refs.*

In search of an effective sampling method for mercury concentration in the atmosphere and to investigate the conditions in Nagoya, measurements were taken at 4 locations using various methods. The methods examined were the wet method with potassium permanganate, the high vol and millipore filter methods, and the Gelman A glass U-shape tube method. Air samples were taken at the Environmental Pollution Research Institute s roof (residential area), a television tower (commercial area), an elementary school (industrial area) and a control area in a village on the shore. The results of these methods tested simultaneously at the institute showed vast differences in the collection rates, ranging between 0.31 and 9.35 microgram/1000 cu m of mercury content in the same atmosphere. The wet method of sampling is considered most effective for the collection rate, but it requires at least 10 cu m of sampling air, much labor and time. The filter methods and the U-shape tube method are simpler. With an untreated filter paper, the collection rate of high volume sampling was about 1% of the wet method measurement and that of a millipore filter was about 2%. With a treated glass filter, the collection rate was about 8%, and the U-shaped tube rate was about 30%. The fluctuation of measurements was smaller when the collection rate was higher. In capturing mercury, the density and permeation speed of the filter paper have much affect on the rate; the existence of an oxidizing agent and sulfuric acid on the filter paper contribute much to the capture rate. This proves that mercury in the air usually exists in the metal or halogen form and not in an amalgam form with dust particles or with other metals. The level of mercury in the air in Nagoya ranged between 0.01 and 0.07 microgram/cu m, far below the maximum allowable standard.

42738 **APTIC NO. 62210**

Hindman, Gary Donald

THE DIRECT DETERMINATION OF METALS IN AIR BY ATOMIC ABSORPTION SPECTROSCOPY. *Louisiana State Univ. and Agricultural and Mechanical Coll., Dept. of Analytical Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-27, 841, May 1973, 129p. 79 refs.*

A flameless atomic absorption instrument in which air is drawn over heated carbon was used to determine mercury and arsenic in ambient air. Impurities in spectroscopic carbon and molecular absorption for a variety of solvents were performed. Spectroscopic carbon electrodes contained arsenic, cadmium, copper, iron, lead, mercury, selenium, and zinc impurities on the carbon surface and in the carbon matrix. Neutron activation analysis was used to confirm their presence. Some evidence for quartz contamination was found. Mercury concentrations in the ambient air were measured with a sensitivity of 0.1 micrograms/cu by the 184.9 nm resonance line rather than the more commonly used 253.7 nm line. The analytical usefulness of the atomic absorption resonance lines in the vacuum ultraviolet portion of the spectrum was thereby demonstrated. The 184.9 nm line was more sensitive than the 253.7 nm line for mercury samples introduced into the atomizer-cell. Air saturated with Hg vapor provided a simple and effective mans of calibration. The sensitivities of several mercury radiation sources were studied. The three resonance lines for arsenic which lie in the vacuum ultraviolet were compared to determine the most sensitive lines for ambient air measurements. The 189.0 nm exhibited the highest sensitivity; the 193.7 and 197.2 lines provided successively lower sensitivities. Attempts to calibrate the instrument using arsenic trichloride, arsine, a platinum loop injector, carbon disks, and direct injection of solutions were unsuccessful. A possible arsenic-carbon interaction was postulated. Molecular and atomic signals from water, benzene, toluene, heptane, formic acid, acetone, butyl amine, and methyl isobutyl ketone were measured at 184.9-9-422.6 nm. Several solvents contained elemental contaminants. The molecular absorption at wavelengths shorter than 217.0 nm was small but significant, especially for water. At longer wavelengths, molecular absorption was nonexistent or very small. Atomic absorption measurements could be made in this region with a continuous carbon atomizer. (Author abstract modified)

42739 **APTIC NO. 66292**

Laane, Jaan and K. Krishnan

DETECTION OF ENVIRONMENTAL POLLUTANTS USING LASER RAMAN SPECTROSCOPY (FINAL REPORT). *Texas Agricultural and Mechanical Univ., College Station, Tex., Dept. of Chemistry, Air Force Contract F 41609-72-C-0029, 62202F, 7164-16-05, Rept. SAM-TR-73-55, 28p., Dec. 1973.*

NTIS, DDC: AD 776290

Laser Raman spectroscopy was used to detect small concentrations of the gases, nitrogen, oxygen, carbon monoxide, hydrogen chloride, nitric oxide, chlorine, hydrogen fluoride, water vapor, sulfur dioxide, carbon dioxide, ammonia, acetylene, and ethane. Gas pressures ranging from 1 atm to a fraction of a torr were used, and gases were run both as pure samples and in the presence of 1 atm of air. The rotational and vibrational spectra were analyzed and tabulated. The frequency best suited for quantitative studies was selected for each compound, along with estimates for detectable ranges. (Author abstract modified)

42740 **APTIC NO. 66324**

Lao, R. C., L. Dubois, P. Piquette, and J. L. Monkman

COMPARISON OF SULFUR DIOXIDE MEASUREMENTS BY COULOMETRY AND CONDUCTIVITY. *Preprint, American Chemical Society, 14p., 1973. (Presented at the American Chemical Society, Annual Meeting, 165th, Dallas, Tex., April 8-13, 1973.)*

The measurement of sulfur dioxide by coulometry and conductivity was investigated and compared. The SO2 concentrations measured by the coulometric iinstrument were plotted against the SO2 concentrations measured by conductivity. The ratio was constant. The conductivity results were higher by 25%, which means that for a concentration of 200 micrograms of SO2 measured by coulometry, the conductivity gives 250 micrograms. The other pollutants emitted at the same time as SO2 are carbon monoxide, carbon dioxide, and oxides of nitrogen. Experiments with 20 ppm CO and 580 ppm CO2 showed no interference for all practical purposes. Charts obtained for nitric oxide measurements were compared with SO2 results and the discrepancy between the two SO2 analyzers was observed when NOx and NO2 concentration were nil or almost zero. The time response of the two instruments could not explain the difference.

42741 **APTIC NO. 66095**

Lel chuk, V. L. and V. B. Etkin

INVESTIGATION OF HOT PLATE ANEMOMETER FOR MEASURING FLOWRATE OF DUST LADEN GAS. *Thermal Eng. (English translation from Russian of: Teploenergetika), 20(11):45-48, 1973. 4 refs.*

A hot plate anemometer was developed for measuring the flowrate of dust laden gas. It consists of six plates symmetrically arranged over the cross section. A model was installed for preliminary investigations in a dust air flow at the outlet of a nozzle 10.7 mm in diameter. After many tests the plate surface was clean although all cold components of the plant situated near it were covered with a layer of dust. Experiments at different concentrations of dust of brown coal and anthracite show that at concentrations up to 0.4 kg/kg the influence of dust on temperature head, other conditions being equal, is within 1-2%.

42742 **APTIC NO. 66528**

Levin, P. L. and D. Kendall

APPLICATION OF ODOR TECHNOLOGY TO MOBILE SOURCE EMISSION INSTRUMENTATION (FINAL REPORT). *Little (Arthur D.) Inc., Cambridge, Mass., Coordinating Research Council and Environmental Protection Agency Contract 68-02-0561, Proj. 1A1010 26 ACV /7, Program Element 1A1010, Rept. EPA-650/2-73-025, 89p., Sept. 1973. 5 refs.*

An instrumental method for measuring the odorous species in diesel exhaust was developed. Liquid chromatography is used to separate the exhaust sample collected on a solid substrate. The fractions containing the odor are sensed using an ultraviolet detector which does not respond to many of the species which are not odorous. There is a correlation between the odor observed by this method and the odor observed by subjective panels. Collection and analysis are described. The methodology for determining the total intensity of aroma is described using odor panels and the summary of chemical composition of diesel exhaust. (Author abstract modified)

42743 **APTIC NO. 61807**

Miyazaki, Akira

MICROANALYSIS OF POLLUTANTS BY PLASMA EMISSION SPECTROCHEMICAL ANALYSIS METHOD. *(Purazuma hakko bunkoho ni yoru osen busshitsu no biryo bunseki ni tsuite). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(6):369-384, Nov. 1973. 52 refs.*

The new emission spectrochemical analysis using plasma is highly accurate in the quantitative determination of traces of various elements existing in ppm levels. Plasma emission spectrochemical analyzers are classified into two types; the high-frequency plasma torch using a high-frequency electric current as the electric field, and thy plasma jet using a direct current as the electric field. The features common to both types of plasma emission spectrochemical analyzers are high sensitivity due to the temperature of the plasma flame, higher accuracy and reproducibility due to increased stability of the plasma flame, high sensitivity in analysis of hard-to-dissociate elements, and the capability to perform simultaneous quantitative and qualitative analyses of elements more quickly than atomic absorption analysis. There are two representative types of the high-frequency torch, one using 27-30 MHz microwaves another using 2450 MHz microwaves. The basic structures of the 27-30 MHz and 2450 MHz plasma torches are illustrated herein. The performance characteristics of a high-frequency plasma torch are described. Applications of the plasma torch to analytical chemistry are reported. Sensitivity of the plasma emission spectrochemical analysis is shown for various elements as measured in terms of the detection limit. Effects of co-existing elements are also described. The structure and performance characteristics of a plasma jet emission spectrochemical analyzer are also described.

42744 **APTIC NO. 54085**

Nishiyama, Keitaro, Hitoshi Yano, and Michinobu Kawano

DETERMINATION METHOD OF POLYCHLOROBIPHENYL IN AIR AND ITS VAPORIZATION FROM NON-CARBON COPY PAPER. *(Kanatsushi ni yurai suru kukichu enka bifeniru ni kansuru chosa kenkyu). Text in Japanese. Shikoku Igaku Kaishi (J. Shikoku Med. Assoc.), 29(4):305-310, Aug. 25, 1973. 9 refs.*

Polychlorinated biphenyls (PCBs) in air were simply and efficiently collected on a column packed with Shimalite (solid support for gas chromatography, 60-80 mesh, Shimadzu) and cooled with ice -salt. The recovery of vaporized KC 300 in air was about 95% under the condition of 51 l/min of air flow for 3 hr. The PCB concentrations in air were determined in the rooms of T Savings Bureau. The values ranged from 8.7 to 21.1 micrograms/cu m in the room where about 600,000 sheets of cards of non-carbon copy paper were kept. The PCB concentration was 1.1 micrograms/cu m in the room in which several workers were handling the cards. Fifty pairs of this non-carbon copy paper containing 20,000 micrograms/g and 1200 micrograms/g of PCB, respectively, were hung in a glass chamber. About 0.5 cu m of air at different temperatures was sucked through this chamber. The vaporization of PCBs from the paper was greatly influenced by air temperature. The lower chlorinated PCBs especially were more rapidly vaporized than the higher chlorinated ones with the rise in temperature.

42745 **APTIC NO. 66321**

Paulus, John J.

ENVIRONMENTAL MONITORING HELPS RESOLVE POLLUTION PROBLEMS. *Westinghouse Eng., 1973:1-8, Sept. 1973. 2 refs.*

Air quality sensors which can be used with an environmental monitoring system developed for the electric utilities, industries, and public agencies are discussed. The systems automatically sense, record, and transmit environmental conditions, and provide data for instant computer analysis. Air quality sensors are available for sulfur dioxide, particulate matter, nitrogen dioxide, oxidants (as ozone), hydrocarbons, and carbon monoxide. Reliable means of measuring SO2 include a flame photometric sensor, and coulometric, conductimetric, and colorimetric methods of detection. The two devices acceptable for particulates are the high volume sampler and the filter tape sampler. The most modern, continuous monitors of NO2 use photometric detection of chemiluminescence resulting from reaction of nitric oxide and O3. Ozone is detected using the same method with the O3 reacting with ethylene. Hydrocarbons are detected by burning a gas sample in a hydrogen flame that ionizes the hydrocarbon molecules. The nondispersive infrared analyzer is a proven sensor for the continuous monitoring of CO.

42746 **APTIC NO. 66296**

Plummer, J. M. (comp.)

A LABORATORY MANUAL FOR THE CHEMICAL ANALYSIS OF EMISSIONS, AMBIENT AIR AND PLANT TISSUES. *Dept. of Lands, Forests and Water Resources, Province of British Columbia, Chemistry Lab., 66p., Feb. 1973. 7 refs.*

A laboratory manual for the chemical analysis of emissions, ambient air, and plant tissues is presented which describes 65 analytical methods pertaining to measurements of arsenic, cadmium, chlorine, copper, dust fall, fluoride, lead, stationary source particulate emissions, soiling index, sulfation index, sulfur dioxide, suspended particulate matter, total particulates using a low volume sampler, and zinc. Each method described is specified by a seven digit method code which incorporates the parameter, sample type, and method used. The seven digit codes are intended for use when test results are to be entered into a computer storage and retrieval system.

42747 **APTIC NO. 62000**

CARBON MONOXIDE TESTER MODEL CGCOT 2. *(CO-Messgeraet CGCOT 2). Text in German. In: Elektrische Messgeraete fuer den Umweltschutz. Fachverband Messtechnik und Prozessautomatisierung im Zentralverband der Elektrotechnischen Industrie, Frankfurt, West Germany, 1973, p. 28.*

Non-dispersive, continuously operating IR carbon monoxide and hydrocarbon analyzers for the routine control of the CO and hydrocarbon concentrations in automobile exhaust gases, developed by Hartmann and Braun, are described. The CGCOT 2 model CO analyzer is suitable for the continuous measurement of the CO concentrations in spark-ignition engine exhaust gases in a range of 0-10% by volume, as well as of the motor oil temperature. Another NDIR two-beam analyzer was designed for the simultaneous measurement of the CO and hydrocarbon concentrations in the respective ranges of 0-10% by volume for CO, and of 0-1000 ppm or 0-2000 ppm for hydrocarbons.

42748 **APTIC NO. 62005**

AIR TESTING STATIONS. *(Luftueberwachungsstationen). Text in German. In: Elektrische Messgeraete fuer den Umweltschutz. Fachverband Messtechnik und Prozessautomatisierung im Zentralverband der Elektrotechnischen Industrie, Frankfurt, West Germany, 1973, p. 43-44.*

Air quality monitoring stations developed by Siemens AG as integral parts of air pollution monitoring networks are described. Monitoring networks and testing stations are required for urban agglomerations with populations over 500,000, as well as for industrial areas and for single, large-capacity emission sources. Air monitoring networks should give alarm under unfavorable meteorological conditions, and determine the efficiency of short-term and long-term measures taken in the air pollution control area. The air testing stations are equipped with non-dispersive infrared spectrometers for the determination of carbon monoxide and carbon dioxide concentrations, with flame ionization detector for hydrocarbon measurements; flame photometer for sulfur dioxide and/or hydrogen sulfide measurements; chemiluminescent instrument for ozone, nitric oxide, nitrogen dioxide, and total nitrogen oxides concentration measurement, and with backscattering photometer for dust monitoring. The sampling stations are maintained at a temperature of 23 C. Possibilities for the measurement of meteorological parameters are provided for.

1972

42749 **APTIC NO. 66349**

Dimeff, John

NONDISPERSIVE GAS ANALYZING METHOD AND APPARATUS WHEREIN RADIATION IS SERIALLY PASSED THROUGH A REFERENCE AND UNKNOWN GAS. *(National Aeronautics and Space Administration) U. S. Pat. 3,679,899. 9p., July 25, 1972. 1 ref. (Appl. April 16, 1971, 13 claims).*

A novel gas analyzing apparatus for determining the presence and quantity of a particular gas in a gaseous mixture using a nondispersive infrared analyzing (NDIR) technique is described. The density of a reference gas and the density of an unknown gas are selectively modulated as radiation is passed through them. The density is detected so that a mixing of the absorption effects on the radiation passing through each gas produces a particular signal component which is uniquely related to the absorption caused by the reference gas constituents in the unknown gas. This apparatus is practical and overcomes the difficulties in existing NDIR analyzers. Although other analyzers are simple in structure and capable of high sensitivity, they are typically large and heavy and may be subject to serious gas cross-sensitivity effects. They also require the use of pneumatic detectors which may be subject to serious zero drift and microphonic noise problems which have a low frequency response. (Author abstract modified)

42750 **APTIC NO. 66563**

Hanst, P. L.

SPECTROSCOPIC AND LASER METHODS FOR AIR POLLUTION MEASUREMENTS. *Eur. Elect.-Opt. Markets Tech. Conf., Proc., 1st, p. 7-16, 1972 (?). 4 refs.*

The application of electro-optical instruments to the measurement of atmospheric pollution is discussed. All regions of the electromagnetic spectrum are used in this new technology, but the infrared vibration rotation spectrum is used the most. There are two classes of instrument evolving research instruments and monitoring instruments. The best example of a research instrument is the Fourier transform spectrometer which can measure nearly all pollutant gases at nearly all concentration ranges of interest. An important example of a monitoring instrument is the infrared nondispersive cross- correlation system. This system can be built in rugged reliable form for continuous automatic monitoring of one or more chosen pollutants. Laser techniques are assuming an especially prominent role in pollutant measurement science at present. (Author abstract modified)

42751 **APTIC NO. 66339**

Ohring, George, Joseph Otterman, and Joachim Joseph

GLOBAL AIR POLLUTION MONITORING FROM SATELLITES: PROSPECTS AND PROBLEMS. *Society of Engineering Science, Pollut. Eng. Sc. Solutions, Proc. Int. Meet., Soc. Eng. Sci., 1st, Tel Aviv, Israel, 1972, p. 54-69, 1973. 41 refs.*

Global air pollution monitoring from satellites is reviewed in terms of future prospects and problems. The following observations appear feasible from space: vertical profiles of water vapor and ozone, total amounts of most pollutant gases and total aerosol optical depth, and stratospheric minor constituents and pollutants. Observations of vertical profiles of pollutants in the lower troposphere appear extremely difficult. Further research is required on the absorption and scattering properties of pollutants; the distributions, cycles, and variabilities of pollutants; possibilities of microwave and active sensing techniques; instrumentation for remote observation; and mathematical inversion techniques, particularly for aerosols. Observational characteristics are tabulated for the following pollutants: carbon dioxide, water vapor, ozone, carbon monoxide, nitrogen dioxide, ammonia, sulfur dioxide, nitrous oxide, methane, and hydrogen sulfide. Remote infrared detection parameters are also tabulated for some of the above pollutants.

42752 **APTIC NO. 66533**

Zdrojewski, A., N. Quickert, L. Dubois, and J. L. Monkman

THE ACCURATE MEASUREMENT OF LEAD IN AIRBORNE PARTICULATES. *Int. J. Environ. Anal. Chem., vol. 2:63-77, 1972. 9 refs.*

The sampling and atomic absorption spectrophotometric analysis of lead in airborne particulates is discussed with particular reference to high-volume air samples. Measurements of lead particulates taken on a glass fiber sheet is accurate and free of interferences in the range of 0-20 micrograms Pb/ml prepared solution, with the average difference between measurements being 0.11 micrograms/ml; this is true for sample sizes from 4-8% of the exposed area of an 8 by 10 in. filter. Although glass fiber sheet is much too impure for the analysis of most airborne metals, it is possible to analyze Pb since the blank is reasonably uniform and since the amounts of Pb on such filters are large in comparison to the blank. The final error of Pb measurement, as reported, is likely to be more a function of sampling problems such as time and flow measurements and particulate fall off and disturbance in sampling, transit, and storage.

1971

42753 **APTIC NO. 64535**

Ball, Derrick F.

THE IDENTIFICATION AND MEASUREMENT OF GASEOUS POLLUTANTS. *Int. J. Environ. Studies, 1(4):267-274, 1971. 9 refs.*

Existing instrumental techniques for analysis of gaseous pollutants are briefly reviewed. One of the major problems with sampling of the atmosphere is that steady state conditions rarely prevail. Therefore a choice must be taken between spot or continuous samples. Gases can be analyzed by infrared spectroscopy. In a conventional infrared spectrometer, gas pressures of approximately 80 mm mercury or more in a 10 cm long gas cell are normally used to give a reasonable spectrum. To obtain sufficient sensitivity for minor constituents of a gas mixture, a greater amount of gas must be traversed by the infrared beam. This can be achieved by either increasing the path length or the pressure of the gas. Various aspects of infrared spectrometry are described. Ultraviolet spectrometry is generally much more intense than infrared, but interference by normal constituents of air is more serious. Gas chromatography can be used in many applications, such as detection of low concentrations of pollutants with ionization detectors and detection of peroxyacyl nitrates with electron capture detectors. Mass spectrometry measures the ratio of the charge to the mass for an ion. Laser spectroscopy is now being used in pollution measurement. Infrared lasers and remote Raman spectrophotometry are increasingly being used.

42754 **APTIC NO. 66440**

Carlton, R. F. and A. Lehman, Jr.

ANALYSIS OF NASHVILLE AIR POLLUTION VIA NEUTRON ACTIVATION ANALYSIS. *J. Tenn. Acad. Sci., 46(2):63-65, April 1971.*

The use of neutron activation analysis in determining air pollutants is described. Five samples were determined in a sample of Nashville air pollution; aluminum, copper, silicon, phosphorus, and magnesium. The gamma ray analysis was performed using both sodium iodide and germanium (lithium) detectors. The sensitivitiy and problems of this method are discussed. (Author abstract modified)

42755 **APTIC NO. 66274**

McCrone, W. C.

ULTRAMICROMINIATURIZATION OF MICROCHEMICAL TESTS. *Microscope, vol. 19:235-241, 1971. 1 ref.*

A procedure for the ultramicrominiaturization of microchemical tests is described. The limiting sensitivity of the usual Chamot test is about one nanogram since few precipitates contain less than 1% by weight of the test ion. The sensitivity of the Chamot tests using the light microscope can be decreased further only by decreasing the size of the test drop. By using controlled humidity atmospheres, small drops can be maintained until recognizable crystals of precipitate develop. The size of the drop can be increased or decreased at will by changing the relative humidity. The usual 10 mg drop can be decreased to, at least, 10 ng. This reduces the sample size in such tests from the microgram to the picogram range. (Author abstract modified)

42756 **APTIC NO. 66501**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

SAMPLING METHODS FOR PARTICLES. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 2, p. 25-75. 56 refs.*

Sampling instruments for particle sizing are reviewed. They include those which capture a bulk sample of dust, mist, smoke, or fumes in a convenient form for transportation to the laboratory, and those which, while collecting a sample, effect a size separation or classification of particles which becomes an integral part of the subsequent analytical procedure. Sampling instruments may also be differentiated by suitability for use indoors or outdoors, use in bulk sampling, suitability for in situ examination, and ability to give a representative sample. Isokinetic sampling occurs when the sampling is conducted so that the flow rate at entry to the sampling probe is at the same velocity as in the main gas stream. Particle collection methods which do not classify or size-segregate the sample include settling chambers, impingement and impaction samplers, thermal precipitators, electrostatic precipitators, and filter samplers. Collection methods which do classify particles into size groups include cascade impactors and winnowing samplers using gravitational and centrifugal force. Bulk material sampling is also discussed, including collection of a gross sample, reduction of a gross sample to a convenient size, and preparation of a reduced sample for analysis.

42757 **APTIC NO. 66502**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

DIRECT METHODS OF PARTICLE SIZE ANALYSIS. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 3, p. 76-135. 62 refs.*

Analytical methods and instruments for performing size analyses are described. With direct particle measurement, the dimensions of individual grains are compared directly to the calibrated scale. Accuracy of measurement may be very great when an instrument of high sensitivity is used. Sieve analysis methods discussed include sieve calibration, air-jet sieve, and micromesh screens. The optical microscope, preparation of slides, and size analysis are described for optical microscopic techniques. The electron microscope, preparation of samples, exposure and photography, and measurement are described for electron microscopy. Applications, specimen preparation, and the method in scanning electron microscopy are also discussed.

42758 **APTIC NO. 66503**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

PARTICLE SIZING BY MEASUREMENT OF A PROPERTY RELATED TO GRAIN SIZE. *In: Particle Size Analysis in Industrial Hygiene. New York. Academic Press, 1971, Chapt. 4, p. 136-195. 74 refs.*

Numerous methods exist which can be used to measure particle size by evaluating a known characteristic (such as settling velocity) related to grain size, rather than by performing a direct scalar measurement. With indirect measurement, the size is calculated from the relationship between size and the property which is a function of size. The accuracy of indirect methods depends on the correctness of the assumptions on which the size relationship is based. Instruments which give data on average size and size distribution are discussed, including methods based on settling velocity in a fluid medium (fractionating instruments based on particle settling velocity, such as air and liquid elutriation; fractionating instruments based on centrifugal and inertial force such as the Federal classifier and the micro-particle classifier; and nonfractionating instruments based on particle settling velocity such as gravity sedimentation in air or in liquids and centrifugal sedimentation in a liquid) and miscellaneous methods (optical methods, special methods applicable to liquid drops, and particle sizing of radioactive aerosols). Instruments which determine average diameter only are also discussed, including adsorption, permeability, low-angle X-ray diffraction, cohesion of surface films, reaction velocity, optical methods, diffusion battery, and count-weight methods.

42759 **APTIC NO. 66504**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

AUTOMATIC PARTICLE COUNTING AND SIZING INSTRUMENTS. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 5, p. 196-234. 47 refs.*

Automatic particle counting and sizing devices may be divided into two categories according to whether particles are separated from the gas phase prior to measurement or are drawn into the sizing instrument as an unaltered aerosol. In the first category are devices that can scan a microscope slide and devices that pass a suspension of particles in a liquid through a continuous particle counter and sizer after the particles have been collected, such as a Greenburg-Smith impinger.

The second category consists of devices which conduct the aerosols directly through a sensing zone. Various automatic particle counting and sizing instruments are described. In the first category these instruments include optical spot scanning and optical slit scanning (which scan a microscope slide) and the Coulter counter which uses a suspension of particles in a liquid. Devices in the second category include light scattering methods, electric charge instruments, devices using thermal effects of a heated filament, and other methods such as acoustic, momentum, and heat transfer.

42760 **APTIC NO. 66505**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

PARTICLE SIZING INTERPRETATION. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 6, p. 235-259. 21 refs.*

When dealing with a monodispersed system of spherical particles, a single size parameter (diameter) describes the general size characteristics of all particles in sufficient detail. However, when particles of many sizes occur together, a single parameter is inadequate to describe the sizes of all the particles that are present. Measurements must be made over the full range of sizes present, and size interpretation and representation become a matter of applied mathematical statistics. Graphical and mathematical representations of particle size are discussed. An interpretation of particle size by count data is described, and stratified sampling, confidence limits, and graphical methods for nonlinear size distributions are reviewed. An interpretation of particle size by weight data is also discussed.

42761 **APTIC NO. 66506**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

APPLICATIONS OF PARTICLE SIZE ANALYSIS. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 7, p. 260-303. 123 refs.*

Suspended particles are encountered in association with many processes and locations. Particle size is of special concern in industrial hygiene and toxicology laboratories for studying the physical and physiological behavior of fine particles; in chemical and biological laboratories using or creating solid or liquid particle dispersions or radioactively tagged microbial aerosols; in clean rooms; in evaluating nuclear fallout; and in studies of precipitation, weather modification, and meteorological transport. Typical applications of particle size analysis to industrial hygiene, radiation protection, air pollution control, industrial toxicology, and related areas are discussed. Applications of particle sizing to industrial hygiene and radiation protection include deposition of inhaled particles, size measurement of airborne particles, measurement of particle size in tissues and biological fluids, respirator testing, and identification and measurement of individual radioactive particles. Applications of particle sizing to air pollution control and fallout studies include sampling of stacks and process effluents, community air sampling, particle sizing of mists, fogs, and other droplets, stack dispersion studies, condensation nuclei, fallout studies, and high-altitude sampling. Applications of particle sizing to toxicological studies include measurement of generated aerosols, measurement of respired particles, and aerobiology.

1968

42762 **APTIC NO. 66018**

Perelman, A. Y.

ON THE DETERMINATION OF SIZE DISTRIBUTION OF NATURAL AEROSOLS BY EXTINCTION COEFFICIENT. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 349-351. 5 refs. (Aug.)*

The size distribution of natural aerosols can be determined by extinction coefficient. An asymptotical formula for scattering and extinction cross sections and a transparency method to calculate transparency particle distribution by the data of the volume scattering coefficient are employed. A new method is proposed which is available for both transparent and absorbing particles and some other problems of atmospheric optics.

42763 **APTIC NO. 66021**

Tinsley, Brian A.

MEASUREMENTS IN THE 13-15 MICRON RANGE WITH A GRILLE SPECTROMETER. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 421-422. 4 refs. (Aug.)*

The design of a grille spectrometer and its application in the 13-15 micron range are described. It can be used for measurements in the 15 micron and 4.3 micron bands of carbon dioxide, for obtaining temperature profiles, and for obtaining measurements of emissions from other atmospheric constituents, e.g., water vapor or ozone. The instrument operates like a conventional slit spectrometer except that a grille replaces slits in the entrance and exit positions.

1965

42764 **APTIC NO. 66447**

Harris, C. C. and A. Jowett

SIZE ANALYSIS IN THE SUB-SIEVE RANGE BY ELECTONIC COUNTER. *Nature (London), 208(5006):175-176, Oct. 9, 1965. 9 refs.*

The electronic apparatus for the rapid measurement of particle content and size distribution, known as the Coulter counter, is being used in many fields. A typical count requires about 5-25 sec and is performed at a rate up to 600 particles/sec. A size range of about 500-0.5 micron can be covered, therefore overlapping with sieving, microscope, and sedimentation methods. After applying certain corrections and calibration constants, the basic data relate the numbers of particles greater than a stated size to the particle volume. This information is readily converted into the relationship between cumulative volume above a stated size (V) and a particle size (X). A mathematical method is presented for determining the total solid volume without resorting to a gravimetric analysis or a trial and error method which might be unreliable. The unknown asymptote can be determined graphically. The method is an extrapolation technique; there is no certainty that the size distribution law outside the measured range is the same as that inside. Thus, results obtained from this method must be used with discretion; it is not a substitute for an effective and rapid particle size analysis technique for the submicron region which is still needed.

AIR QUALITY MEASUREMENTS

1974

42765 **APTIC NO. 66144**

Bodhaine, B. A. and B. G. Mendonca

PRELIMINARY FOUR WAVELENGTH NEPHELOMETER MEASUREMENTS AT MAUNA LOA OBSERVATORY. *Geophys. Res. Lett., 1(3):119-122, July 1974. 13 refs.*

A 4 wavelength nephelometer was the instrument used to monitor aerosols at Mauna Loa Observatory in Hawaii. The instrument is capable of measuring the clean air (nighttime downslope wind conditions) aerosol light scattering coefficient of approximately 3 times 10 to the -7th power/m, about 1% of the molecular scattering of air. Typical light scattering values for dirty (upslope) wind conditions are of the order of 5 times 10 to the -5th power/m. Although rare, vigorous fountaining at Kilauea Volcano occasionally ejects particulates into the upper air and encroaches upon the clean air at Mauna Loa. However, volcanism does not interfere significantly with the background monitoring program. The aerosol size information obtained from the nephelometer functions as an indicator of the aerosol source and therefore of possible global trends in aerosol size or concentration. The effects of wind and precipitation on aerosol concentrations are mentioned. (Author abstract modified)

42766 **APTIC NO. 66121**

Dockerty, A. and E. Bayley

POLLUTION OF URBAN ENVIRONMENTS BY ROAD TRAFFIC. *Surveyor, 144(4287):26-30, 36, Aug. 1974. 15 refs.*

Results are reported from the sampling of raod traffic generated air pollution at two urban sites in Great Britain. Street air is continuously drawn for sampling with a small electric pump, and carbon monoxide concentrations are measured with a non-dispersive infrared gas analyzer. Data are tabulated for CO concentrations at the two sites and for traffic characteristics and micro-climate observations. The results indicate that background levels of CO are likely to be of the order of 10 ppm or less for much of the time. Application of a formula developed by American investigators which correlates CO concentrations and traffic intensity with lead concentrations and traffic intensity to the observed findings results in an estimated lead concentration of 18.74 micrograms/cu m. Relative CO concentrations are also shown for different elevations on streets sampled.

42767 **APTIC NO. 65989**

Jost, D., R. Kaller, H. Markusch, and W. Rudolf

ANALYSIS OF SIX YEARS CONTINUOUS AIR POLLUTION SURVEILLANCE. *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 251-265, 1974. 18 refs. (June 5-8.)*

Low wind velocity and frequent temperature inversions characterize the air pollution conditions in the industrial area of Frankfurt/Main between the mountains of Odenwald, Spessart, and Taunus. Due to the topographic situation, the prevailing winds are from the southwest and northeast. Population, traffic density, and industrialization have increased in the area, further increasing air pollution. Therefore, air pollution in the area was surveyed for six years. The air pollution monitoring station program its data handling system are described. Carbon monoxide, carbon dioxide, sulfur dioxide, hydrocarbons, nitrogen oxides, particulates, wind velocity and direction, temperature, humidity, and radiation balance were measured at a central station, and SO2 and CO were measured at two satellite stations. Sulfur dioxide measurement results are presented. The air quality measurement results varied with the time of measurement and the location of the sites. Traffic exhausts, topography, and meteorology affected the results. Strong correlations occurred between some pollutants, especially during high concentration episodes. Total particulate matter correlated with SO2 and NOx; lead correlated with CO; and SO2 did not correlate well with CO. Thus, SO2 and CO may be used as tracers. During pollution episodes and normal periods, pollutants showed regular variations distinguished by source variation. An example of the SO2 and CO trends in the Frankfurt/Main central station is presented.

42768 **APTIC NO. 66384**

Maejima, Takaaki and Koichi Umehara

AIR POLLUTION IN THE HAMAMATSU AREA. *(Hamamatsu chiku no taiki osen ni tsuite). Text in Japanese. Shizuoka-ken Kogai Boshi Senta Nenpo (Bull. Environ. Pollut. Contr. Res. Center Shizuoka Prefect.), no. 1:123-125, March 1974.*

As a result of continuous monitoring of sulfur oxides since 1967 at 10 locations in Hamamatsu city, the area around the textile industries experimental station was found to be one of the most polluted areas of the city. A more detailed study was made in the area with seven other locations surrounding the station. The results confirmed that the area was a center of a localized pollution. The sulfur trioxide measurements by the lead dioxide method ranged from 0.99 mg/day/100 sq cm in February and March to 1.64 mg in April. The index ranged between 1.5 and 4.0 compared to a figure of 1 at the city hall. The year s average was 1.03 mg, the index 2.7, and the area had the second highest pollution of the city.

42769 **APTIC NO. 62802**

Megaw, W. J., M. S. Hirt, and E. F. Muller

AIR POLLUTION OVER TORONTO. *Inst. National de Recherche Chimique Appliquee, Paris (France), Proc. Colloq. Int. Atmos. Polluees, 11th, Paris, France, 1974, p. 16-1-16-10. 2 refs. (May 8-10.)*

The air quality measurement program in Ontario, the Ontario Air Pollution Index, and air pollution control in Ontario are reviewed. In spite of controls, a brown haze can be seen at levels of 300- 600 m above the ground on certain days over Toronto. Measurements were made by a sampling probe in an aircraft to determine meteorological conditions and pollutant concentrations related to the haze. The concentration of Aitken nuclei was measured using a Gardiner Counter. Samples of droplets and particles were collected by an impactor. Sulfur dioxide concentrations were measured with a Sign-X model 604B analyzer, and nitrogen dioxide with a chemiluminescent analyzer. A high volume air sample was also collected. Wind speed and direction, ambient temperature, and humidity were measured. Measurements were taken over a variety of rural and urban areas upwind, downwind, and over Toronto. On Aug. 16, 1973, extensive haze covered metropolitan Toronto during the early morning flight. By the afternoon flight, visibility had improved. The major sources of SO2 were not operating, so aircraft SO2 measurements were zero. Ground level SO2 concentrations were 0.02 ppm at 8 am and 0.01 ppm at 2 pm. Zero NO2 was measured in the early morning, and the maximum concentration was 0.045 in the afternoon. Aitken nuclei concentrations were uniformly low in the morning, but built up to fairly high levels in the afternoon, except over an area with wind from a nonpolluted area. There did not seem to be a correlation between high concentrations of Aitken nuclei and high concentrations of particles and droplets. The droplet size distributions were close to log normal; the geometric mean diameter in nearly all cases was close to 0.5 micron. The particles approximated to a log normal distribution with geometric mean diameter from 1.1-1.6 micron.

42770 **APTIC NO. 66409**

Takahashi, Royji

THE 1971 HYDROGEN FLUORIDE POLLUTION MONITORING IN THE IHARA COUNTY. *(Showa 46 nendo Ihara chiku fukka suiso osen kanshi kekka ni tsuite). Text in Japanese. Shizuoka-ken Kogai Boshi Senta Nenpo (Bull. Environ. Pollut. Contr. Res. Center Shizuoka Prefect.), no. 1:37-66, March 1974. 14 refs.*

The fluoride pollution in the Ihara County, Shizuoka Prefecture was investigated in 1971 by the newly installed hydrogen fluoride automatic meter and the previously used alkaline filter paper method. The findings were as follows: the year s average by the HF meter was less than 1.0 ppb at all nine measuring points; by monthly averages, two measuring points exceeded 1.0 ppb in summer. The summer wind from south seemed to increase the pollutant concentration in the northern area far from the coastal line which is not usually affected by pollution, and the concentration decreased in the fall. The daily fluctuation pattern of HF concentration was clearly affected by the land and sea breezes, and the concentration increased from noon to 8 pm with the predominance of sea breeze and decreased in morning and during night with land breeze. Compared to the alkaline paper measurement in the previous year, the concentration was lower in the vicinity of emission sources, but the concentration in distant areas did not seem to have decreased.

1973

42771 **APTIC NO. 62187**

Blakeslee, H. William

MEASUREMENT OF STREET LEVEL POLLUTANTS. *Scott Research Labs., Inc., Plumsteadville, Pa., City of Philadelphia Contract, SRL 1337 01 0573, 99p., May 1973.*

Ambient air quality measurements were made at 10 locations in Philadelphia for periods of 3 to 8 days at each location. The study showed the levels to which pedestrians and center city residents are exposed during high traffic periods. It provided a correlation between traffic conditions and pollution levels, and showed the ratio of traffic pollutants to other pollution sources at street level. Special tests performed in the program included the study of the effectiveness of street sweeping in reducing particulates, the validity of the carbon monoxide measurements at the CAMP station, and the correlation between grab samples and continuous readings. A test van was used as a mobile laboratory for the project. Carbon monoxide, nitrogen dioxide, nitric oxide, particulates, odors, and traffic were measured. Out of 69 sample days, 29 had 8-hour averages higher than the CO standard of 9 ppm. The standard was exceeded on 24 out of 43 business days. The daytime NO2 concentrations were within the Federal standard of 5 pphm. The particulate standard of 260 micrograms/cu m (24-hour average) was not exceeded. The geometric mean of all samples was 86.7 micrograms/cu m, which was less than the primary standard of 75 micrograms/cu m. At a typical sight, traffic ranged from 250 to 3000 vehicles/hr. Between 1 and 3% of the vehicles were diesel-powered. The strong odor of auto exhaust was evident several times during the day, especially during afternoon rush hour. The CO, NO, and coefficient of haze concentrations all varied with traffic. Some evidence of the inverse relationship of these pollutants with wind speed was seen at 0400, 1200, and 2300 hours. The NO2 was not a primary constituent of auto exhaust, but rather formed in the atmosphere from the oxidation of NO in the presence of sunlight, as evidenced by its gradual increase during the day. Mobile sources contributed and/or created more than 90% of the particles collected from Philadelphia s air at street level. The primary particles were rubber tire fragments and mineral fragments abraded from the asphalt street.

42772 **APTIC NO. 66483**

Bumbaco, M. J., J. H. Shelton, and D. A. Williams

AMBIENT AIR LEVELS OF MERCURY IN THE VICINITY OF SELECTED CHLOR-ALKALI PLANTS. *Air Pollution Control Directorate, Ottawa (Ontario), Surveillance Div., Rept. Environmental Protection Service 5-AP-73-12, 50p., July 1973. 13 refs.*

Four chlor-alkali plants in Canada were surveyed during late winter and early spring of 1972 to determine airborne mercury concentrations in the vicinities of the plants. Lowest atmospheric values recorded were at one location all below 1000 ng/cu m, with the greatest percentage (39%) in the 100-500 ng/cu m range. More than half of the values recorded at the highest polluted location fell into the 1000-5000 ng/cu m range. The Hg levels were dependent upon such factors as the location of the sampling areas, the prevailing meteorology, and the actual quantity of Hg emitted from a specific source. Mercury levels at some locations were low in relation to the level suggested by the United States as sufficient to protect public health due to inhalation (1000 ng/cu m), while at other locations the levels were significantly higher than the suggested standard.

42773 **APTIC NO. 62929**

Cobb, William E.

OCEANIC AEROSOL LEVELS DEDUCED FROM MEASUREMENTS OF THE ELECTRICAL CONDUCTIVITY OF THE ATMOSPHERE. *J. Atmospheric Sci., 30(1):101-106, Jan. 1973. 30 refs.*

Electrical conductivity measurements of the atmosphere above oceans indicate that most of the global ocean environment, within the planetary boundary layer at least, has maintained a natural aerosol level unchanged by man-made particulate emissions. Significant exceptions are the paths of aerosol pollution extending eastward from the United States in the North Atlantic, from Japan in the North Pacific, and southward from Asia in the Northern Indian Ocean. Anthropogenic aerosols now detectable in some oceanic regions will begin to decline by the end of the century as a result of particulate emission control efforts and an inevitable switch from the burning of fossil fuels to other forms of energy production. Global climatic changes are projected to be insignificant. (Author abstract modified)

42774 **APTIC NO. 62158**

Watanabe, Toshiaki, Yayoe Tominaga, and Hiroshi Kobayashi

SUSPENDED DUST IN KASHIMA DISTRICT. *(Kashima chiku ni okeru fuyu funjin). Text in Japanese. Preprint, Japan Environmental Sanitation Center, Kawasaki, p. 76-79, 1973. (Presented at the National Meeting on Environmental Sanitation, 17th, Nagoya, Japan, Oct. 18-19, 1973, Paper 2.)*

The suspended dust in the Kashima District, a coastal industrial zone, was investigated for analysis of heavy metals. A high-volume sampler with a glass fiber filter and an atomic absorption spectrophotometric analyzer were used. The survey went from May 1971 to Dec. 1972, during which the 24-hour continuous sampling was performed every first and third Thursdays. At the Nikoken measuring station, one of the four measuring stations set up for this survey, the suspended dust was 153 micrograms/cu m, iron 4.69, manganese 10.33, lead 0.22, cadmium 0.003, and benzene- soluble substances 5.6. The total quantity of the dust and the Fe content were higher at Nikoken and Honchuken stations located close to a steel and iron manufacturing plant. The Mn was extremely high at Nikoken only, accounting for 8% of the total dust quantity. This could be attributed to the neighboring Mn factory. The Pb at Nikoken was twice as high than at the other measuring stations. The seasonal trend was studied to find that the fluctuation was primarily due to the local wind direction. There was a high degree of correlation between the suspended dust and its Fe content, the correlation coefficient being 0.732. This indicates both the suspended dust and the Fe content came from the same source. The Pb had a positive correlation with the suspended dust, the correlation coefficient being 0.567, while Mn and Cd seemed to have no such correlation with the dust. Most of the suspended dust consisted of dust from the iron and steel manufacturing plant and that from the sand dune. In addition, there was Mn pollution to a lesser degree in a limited area.

42775 **APTIC NO. 62406**

Yamada, Yasuhiko

SOME PROBLEMS OF PUBLIC NUISANCE IN MORIOKA CITY. *(Morioka-shi no senzaiteki kogai to sono toshi kozo ni kansuru jakkan no mondai). Text in Japanese. Tohoku Chiri (Ann. Tohoku Geogr. Assoc.), 25(3):117-122, 1973. 10 refs.*

The latent urban public nuisance in Morioka City is discussed. It is necessary to study the amount of public nuisance and policies to prevent further nuisance because the urban public nuisance in Morioka City is gradually increasing. In the suburbs of Morioka, the residential area is sprawling, and the construction of drainpipes is lagging behind urban expansion. Thus, the irrigation water in the outskirts of the city is polluted. Although many factories are concentrated in the city, air pollution is slight. Printing factories and lumber mills cause noise pollution. The narrow streets and poor street planning cause traffic jams, increased noise, and increase air pollution. Industrial parks should be built to concentrate all factories. Open spaces formerly belonging to factories should be used as public land. Air quality measurements in Morioka are discussed.

42776 APTIC NO. 66420

Tokyo Metropolitan Government (Japan), Bureau of Pollution Control

ANNUAL REPORT OF CONSTANT MONITORING RESULTS OF AIR POLLUTION IN TOKYO (1972). *(Taiki osen joji sokuteichitsu, sokutei deta shori kekka hokoku). Text in Japanese. 956p., Sept. 1973.*

The entire numerical charts of general air pollution measurements in Tokyo for 1972 are presented. The items included are: sulfur oxides, oxidants, carbon monoxide, suspended particulates, nitrogen dioxide, nitric oxide, and hydrocarbons in the atmosphere, and carbon monoxide, NO2, NO, and the traffic amount with regard to automotive exhaust gases. In addition, the wind directions and wind velocities, and these items in relation to each pollutant, are presented in charts. The sulfur dioxide measurements at the 17 continuous monitoring stations for the year ranged from 0.013 ppm to 0.039 ppm. The oxidant averages were from 0.021 to 0.034 ppm. On Dec. 5, 1972, a very localized high oxidant concentration of 0.38 ppm was noted in front of the Tokyo Metropolitan government office. In few neighboring districts, the measurements were in the 0.20 ppm range on the same day, but other districts had measurements of a normal level. The NO2 measurements were taken continuously at eight monitoring stations in the air and at 10 monitoring stations for NO2 in automotive exhaust gases. The atmospheric NO2 averages were in the 0.030 range, with some 0.040 concentrations. In front of the Metropolitan Government Office, the average was 0.044 ppm and the highest measurement was 0.30 ppm in November. The total monthly average of nitric oxide in exhaust gas was extremely high at two locations in central Tokyo, one at 0.173 and the other 0.151 ppm. In other areas, the total averages were in the 0.050-0.070 range.

42777 APTIC NO. 66421

Tokyo Metropolitan Government Bureau of Public Nuisances (Japan), Dept. of Monitoring

REPORT ON AIR POLLUTION CONTINUOUS MONITORING STATIONS MEASUREMENT RECORDS. *(Taiki osen joji sokuteishitsu sokutei kekka hokoku). Text in Japanese. 523p. Aug. 1973.*

The complete Aug. 1973 data of the Tokyo Metropolitan Government Pollution Control network is presented in tables and maps. The records include those of continuous monitoring of sulfur oxides, oxidants, nitrogen oxides, carbon monoxide, and settling particles taken at Tokyo s 22 general monitoring stations and 26 automotive emission gas monitoring stations. Sulfur oxides were measured by electroconductivity, oxidants by neutral potassium iodide spectrophotometry, NOx by Saltzman reagent spectrophotometry, CO by nondispersive infrared analyzers, and dusts by the light scattering method. One extraordinary phenomenon in Aug. 1973 was the high oxidant concentrations which lasted between Aug. 5 and 12, between noon and 5 pm in east Tokyo, and between 11 am and 4 pm in west Tokyo. The highest measurements were 28 ppm in the Shinjuku area of Tokyo.

1972

42778 APTIC NO. 66446

Jacobs, P. A.

A RANDON MEASURE MODEL FOR THE EMISSION OF POLLUTANTS BY VEHICLES ON A HIGHWAY. *Preprint, The Inst. of Management Science, 29p., 1972. 9 refs. (Presented at Management Science Ecology and the Quality of Life, The Institute of Management Science, International Meeting, 19th, Houston, Tex., April 4-8, 1972, Paper FA6.2.)*

A random measure model for the emission of pollutants by vehicles on a highway is derived. The mathematical model considers a collection of vehicles on a highway, denoting the parameters of position and velocity of some given vehicle (the kth vehicle) at time t. After time zero, the velocity process of the kth vehicle is a continuous Hunt process independent of the velocity processes of the other vehicles but with the same probability law. The discharge of pollutants by the kth vehicle is described by a nondecreasing right continuous process whose probability law depends on the path of the vehicle. An expression is derived for the total amount of pollutants discharged into an area for some time interval. (Author summary modified)

42779 APTIC NO. 66323

Linzon, S. N.

PRE-POLLUTION BACKGROUND STUDIES IN ONTARIO. *Preprint, Soil Conservation Society, Air Resources Div., 22p., 1972. 3 refs. (Presented at the Soil Conservation Society, Annual Meeting, 27th, Portland, Oreg., Aug. 7-9, 1972.)*

Two major pre-pollution baseline studies are being conducted by the Ontario Ministry of thy Environment to indicate the normal conditions in each area prior to industry start-up. The construction plans of the industries (electric power plant and electrolytic zinc plating) were approved by the Air Management Branch with the objective of keeping emission rates within the standards set by the Branch in order to prevent adverse effects on soil, vegetation, and water. A continuous air monitoring program was established to record sulfur dioxide, nitrogen oxides, total oxidants, hydrocarbons, carbon monoxide, and particulate matter about 11 mi from the power plant site. An additional 12 sites were selected at various distances and directions for measuring SO2 and fluoride utilizing lead peroxide and lime candles. If the air quality criteria are exceeded to the detriment of the natural environment, further abatement measures are taken.

42780 APTIC NO. 62015

Rondia, D. and J. de Graeve

ATMOSPHERIC LEAD CONCENTRATIONS IN AN EXTENDED URBAN AGGLOMERATION IN BELGIUM. *(Concentration du plomb dans l air d une grande agglomeration Belge). Text in French. Commission of the European Communities and Environmental Protection Agency, Proc. Int. Symp. Environ. Health Aspects Lead, Amsterdam, Netherlands, 1972, EUR 5004 d-e-f, p. 1015-1021, May 1973. 3 refs. (Oct. 2-6.)*

The concentration of lead particles in the air was measured in 1968 and 1969 in the Liege area of Belgium by taking large samples over an average period away from heavily trafficked areas. The measurements were made by spectrophotometry. The average concentration of lead in the air was between 0.5 to 1 microgram/cu m. It did not vary appreciably with the seasons, in contrast with the total number of particles in suspension in the air, but the figure for one sampling point could be as much as twice the figure at another point. The maximum concentrations over a 24-hour period were of the order of twice the average concentrations. Sulfur dioxide and total particulate concentrations were also measured.

42781 APTIC NO. 62443

Sekigawa, Toshio, Hiroshi Kojima, and Fumio Tanaka

AERSOLS IN THE OCEAN ATMOSPHERE. *(Kaiyo Taikichu no eerozoru ni tsuite). Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 7:36-39, Aug. 1972.*

Between November 1972 and March 1973, an investigation of aerosol concentration and particle distribution for sizes larger than 0.15 micron was conducted in the South Pacific. Based on the findings, emission sources for particles completely away from the land are to be studied. Aerosol concentration was measured by an improved Pollack Counter. Particle size distributions were measured by a Royce Particle Counter. Samples were taken daily on clear days at noon. Data within 1000 km from any land in the northern hemisphere were excluded. All measurements in the southern hemisphere were 300-400 particles/cu cm. These are close to one record of a 1951 investigation, but considerably lower one done in the Atlantic, which ranged from 956 to 1019 cu cm in July-August, 1951, and another on the Atlantic which averaged 600/cu cm in 1971. Concentrations in all areas decreased usually with an increase in wind when particles were large. In the area of 0.15-micron radius, the pattern was not clear.

42782 **APTIC NO. 66231**

Takeuchi, Ushio

VARIATION IN CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN PRECIPITATIONS. *(Kosuichu no kagaku busshitsu nodo no hendo ni tsuite). Text in Japanese. Chikyu Kagaku (Earth Sci.), 5(1):1-12, 1972. 11 refs.*

The variation in the concentrations of some chemical constituents in precipitation was studied from January 1967 through October 1971 at Kichijoji, Tokyo. Chloride ion concentration showed a maximum in December and a minimum in April, while sulfate concentration reached a maximum in December-January and a minimum in June. A steadily increasing tendency was observed for increasing concentrations of Cl ion and SO4 ion from year to year, with a single exception during the period of 1967-1970 when SO4 concentration remained the same. Concentrations of chemical constituents in the precipitation depended on the trajectories of air masses from which precipitation is supposedly derived; precipitation derived from air masses passing through industrial areas contained higher amounts of divalent zinc, chloride, sulfate, and divalent calcium.

42783 **APTIC NO. 65758**

Prefecture de Police, Paris (France), Laboratoere Central

AIR POLLUTION STUDY IN PARIS AND ITS PERIPHERY IN 1971. *(Etude de la pollution atmospherique a Paris et dans les departements peripheriques en 1971). Text in French. Centre Interprofessionnel Technique d Etudes de la Pollution Atmospherique Rept. 40, I. F. C.E. Rept. A 8 253, CI 762. 14p., June 1972.*

The results of systematic air pollution monitoring conducted in PParis in 1971 are presented. The annual averages of the carbon monoxide concentrations measured in different parts of Paris ranged from 10.6 ppm to 24.4 ppm, indicating a slight increase over the 1970 values. The average CO concentration in underground structures was 24.2 ppm. Correlation between the CO concentration and the length of the tunnels was established. The CO concentrations in the city were lowest on weekends and during the vacation period, and highest during the rush hours. The hourly limit of 40 ppm was exceeded in 0.25% of the time. The CO concentrations measured along a busy highway averaged 2.4-3.4 ppm, and average lead concentrations of 3.5-4.9 micrograms/cu m were measured. Correlation between the CO and lead concentrations with a coefficient of 0.8 was found. With an annual mean of 29.6 micrograms/cu m, the extrema of the nitrogen dioxide concentrations were 3.9 micrograms/cu m and 63.7 micrograms/cu m. The NO2 concentrations were dependent of the solar radiation and the traffic density. The pollutant concentrations measured during a strike of the transport workers revealed prolonged duration of the maxium concentrations, and considerable increase of the law and medium values rather than of the maxima proper. Systematic inspections of combustion equipment showed abnormal combustion conditions in 21%, and Bacharach indices over 6 in 4.5% of all cases.

1970

42784 **APTIC NO. 66335**

Bourelly, T.

AIR POLLUTION AROUND A PETROLEUM REFINERY. PRELIMINARY STUDY OF THE PREEXISTENT POLLUTION. *(La pollution atmospherique autour d une raffinerie de petrole etude preliminaire de la pollution preexistante). Text in French. Cahiers Centre Sci. Tech. Batiment, 933(107):1-7, March 1970.*

The air pollution surrounding a petroleum refinery in Vernon, France was investigated. A preliminary study of the preexistent pollution was made and will be compared to the atmospheric pollution after the refinery is in operation. Changes in general atmospheric pollution are considered when assessing those observed within the zone being studied.

1956

42785 **APTIC NO. 66485**

Rossano, August T., Jr.

THE JOINT CITY, COUNTY, STATE AND FEDERAL STUDY OF AIR POLLUTION IN LOUISVILLE. *J. Air Pollution Control Assoc., 6(3):176-180, March 1956. (Presented at the Air Pollution Control Association Annual Meeting, 49th, Buffalo, N. Y., May 20-24, 1956.)*

The planning and development of the joint city, county, state, and federal study of air pollution in Louisville, Ky. are described. The quality of the air in and around the West End was determined by analyses for various particulate and gaseous pollutants and by studying the variations and fluctuations in their concentrations with respect to time and space. The interrelationship between air quality and both meteorologic and micro-meteorologic factors was determined. Basic principles were adopted as guides: comprehensive or area wide approach involving a network of fixed observation stations; measurements on a simultaneous and continuous basis 24 hr/day; sampling periods for estimating diurnal patterns; and thorough analysis of selected samples. Air pollution sources were inventoried by studying plant processes, materials, mechanical equipment, waste products, and points of emission. The nature and origin of odors were surveyed and samples were collected and catalogued.

ATMOSPHERIC INTERACTION

1974

42786 **APTIC NO. 66551**

Bouscaren, R.

MODEL STUDY OF THE STACKS OF TWO CENTRAL HEATING STATIONS. *(Etude sur maquette des cheminees de deux chaufferies). Text in French. C.I.T.E.P.A. (Technical Interprofessional Study Center for Air Pollution), Etudes Documentaires 42, CI 799, 13p., 1974.*

A visual and instrumental model study of two stacks planned for remote heating stations for the determination of the stack height is described. Carbon dioxide was used as tracer for the study of the dispersion of sulfur dioxide. Due to the location of the stacks in an urban area where an additional SO2 concentration increase of 0.09 mg/cu m is not to be exceeded, and due to the presence of high-rise buildings nearby, the necessary stack height was determined to be 120 m, compared to a height of 60-65 m required by the related regulations.

42787 **APTIC NO. 66460**

Briggs, Gary A.

PLUME RISE FROM MULTIPLE SOURCES. *National Oceanic and Atmospheric Administration, Oak Ridge, Tenn., Air Resources Atmospheric Turbulence and Diffusion Lab., Rept. 91, 35p., March 1974. 21 refs.*

A simple enhancement factor for plume rise from multiple sources is proposed and tested against plume rise observations. A formula for multiple source rise for bent-over, buoyant plumes is suggested which incorporates the single source rise, the number of sources, and the total width of source configuration. A crude but simple method for calm conditions is suggested in order to predict the height of plume merger and subsequent behavior based on the geometry and velocity variations of a single, buoyant plume. Large clusters of buoyant sources are postulated to possibly give rise to concentrated vortices, either within the source configuration or just downwind of it. (Author abstract modified)

42788 **APTIC NO. 66244**

Brimblecombe, P. and D. J. Spedding

THE CATALYTIC OXIDATION OF MICROMOLAR AQUEOUS SULPHUR DIOXIDE-I. OXIDATION IN DILUTE SOLUTIONS CONTAINING IRON (III). *Atmos. Environ., 8(9):937-945, Sept. 1974. 21 refs.*

Traces of metal ions have been considered by some to be necessary to catalyze the oxidation of sulfur dioxide dissolved in the atmospheric aerosol if this pathway is significant in removal of SO2 from the atmosphere on a global scale. An attempt was made to establish the rate of oxidation of low concentrations of SO2 (about 0.00001 M) in aqueous solutions containing traces of iron(III) (about 0.000001 M), since these concentrations approach those which might be expected in the atmospheric aerosol. The rate of oxidation of SO2 by oxygen in pure water varied with pH, having a maximum rate at pH 6 where the half life for the reaction was 250-350 min. The variable results for the oxidation in pure water were due to contamination by trace (about 5 times 10 to the -8th M) Fe(III). The Fe(III) at 0.000001 M concentration was a true catalyst for SO2 solution oxidation; its role can be explained by a free radical chain reaction. Using the rate data obtained in these experiments, a calculation of the possible rate of oxidation of SO2 in fog droplets in the atmosphere is described. (Author abstract modified)

42789 **APTIC NO. 66172**

Bromfield, A. R.

THE DEPOSITION OF SULPHUR IN THE RAINWATER IN NORTHERN NIGERIA. *Tellus (Uppsala), 26(3):408-411, 1974. 9 refs.*

The concentrations and amounts of sulfate in rain were measured at 11 sites situated between 350 and 880 km from the sea in Northern Nigeria during two rainy seasons. In both years, concentrations showed a similar pattern at each site, being greatest at the beginning and end, and smallest at the peak of the rains. The presence of anthropogenic atmospheric sulfur at the start of the rains, and of harmattan dust and lower precipitation at the beginning and end of the rains accounts for the concentration pattern observed. Amounts of sulfur deposited ranged from 0.49-1.89, mean 1.14 kg S/ha. An estimate of dry deposition of sulfur was made from the intercept on the y axis of a plot of the amount deposited against rainfall. The dry deposition rates were 0.26 and 0.43 times 10 to the -12th power g S/sq cm/sec, respectively. The agricultural importance of the deposition is briefly discussed. (Author abstract)

42790 **APTIC NO. 66433**

Charlson, R. J., W. M. Porch, A. P. Waggoner, and N. C. Ahlquist

BACKGROUND AEROSOL LIGHT SCATTERING CHARACTERISTICS: NEPHELOMETRIC OBSERVATIONS AT MAUNA LOA OBSERVATORY COMPARED WITH RESULTS AT OTHER REMOTE LOCATIONS. *Tellus (Uppsala), 26(3):345- 359, 1974. 23 refs.*

Background aerosol may be defined as that which exists in remote locations, well away from local variable sources. The total contribution to the optical aerosol extinction coefficient due to scattering and that contribution due to the scattering into the backward hemisphere (hemispheric backscatter) are important due to their role in determining atmospheric extinction and albedo, respectively. Specially adapted instruments are described for measuring these parameters in remote sites at various altitudes in the troposphere. Preliminary field measurements are described and data compared for several sites and altitudes. The Mauna Loa Observatory, Hawaii, is of particular interest since it has been used for studies of carbon dioxide increases. The measured light scattering coefficient due to aerosol at 500 nm wavelength is approximately 10% of the Rayleigh scattering of the gas molecules and provides a base line to which future changes may be referred. The results for the hemispheric backscatter (or albedo) indicate a value occasionally above that coefficient predicted by the Mie formulas and assumed size distribution of spherical particles. (Author abstract)

42791 **APTIC NO. 66169**

Eagan, Richard C., Peter V. Hobbs, and Lawrence F. Radke

MEASUREMENTS OF CLOUD CONDENSATION NUCLEI AND CLOUD DROPLET SIZE DISTRIBUTIONS IN THE VICINITY OF FOREST FIRES. *J. Appl. Meteorol., 13(5):553-557, Aug. 1974. 8 refs.*

Airborne measurements of cloud condensation nuclei (CCN) were made in the vicinity of a planned burn of natural forest products. The concentrations of CCN, active at 0.5% supersaturation, reached a peak value of 5000/cu cm about 38 km downwind of the fire, compared to concentrations of 250-500/cu m upwind. Approximately 6 times 10 to the 10th power CCN were estimated to be produced per gram of wood consumed. On aonther occasion the microstructure of small cumulus clouds was measured in the vicinity of a natural forest fire. The droplet size distributions were narrower and the concentrations of droplets were higher in two clouds situated in the fire plume than in two clouds upwind of the plume. (Author abstract)

42792 **APTIC NO. 66104**

Freiberg, Johnny

EFFECTS OF RELATIVE HUMIDITY AND TEMPERATURE ON IRON-CATALYZED OXIDATION OF SO2 IN ATMOSPHERIC AEROSOLS. *Environ. Sci. Technol., 8(8):731-734, Aug. 1974. 24 refs.*

The effects of relative humidity and temperature on iron-catalyzed oxidation of sulfur dioxide in atmospheric aerosols were determined. The oxidation of SO2 to acid mist is a major cause of production of sulfate ion pollutant in urban atmospheres. Sulfur dioxide and sulfuric acid aerosols are responsible for damage to vegetation and materials, and for harmful effects on humans. The oxidation rate increases rapidly with increasing relative humidity (particularly at high relative humidities), and it decreases by about an order of magnitude for an increment of 5 C in temperature. There is a qualitative agreement between these results and the observed rates of SO2 oxidation in the atmosphere. (Author abstract modified)

42793 **APTIC NO. 66224**

Fumarola, G., M. Del Borghi, and G. Ferraiolo

MODEL STUDY OF AIR POLLUTANT DISPERSION. I. PRELIMINARY RESULTS OF WIND TUNNEL TESTS. *(Studio mediante modelli della dispersione degli inquinanti nell atmosfera. I. Risultati preliminari da sperimentazioni in galleria del vento). Text in Italian. Riv. Combust., 28(3):91-96, March 1974. 14 refs.*

An aerodynamic model of atmospheric dispersion of gaseous pollutants is presented. Aerodynamic models are more accurate for the study of complex situations given the presence of more emission sources and irregular oro-topographic characteristics in the area of influence. The proposed model is composed of a wind tunnel in the shape of a parallelepiped, 6 m long, and 1 1/2 m wide and high. The initial set of experimental data is presented, confirming the validity of formulas such as Holland s and Smith s equations, currently used for the calculation of dispersion systems.

42794 **APTIC NO. 64814**

Hanna, Steven R.

FOG AND DRIFT DEPOSITION FROM EVAPORATIVE COOLING TOWERS. *Nucl. Safety, 15(2):190-196, March-April 1974. 26 refs.*

Methods of determining fog and drift deposition due to emissions from evaporative cooling towers are reviewed and formulas suggested that can be used as a basis for calculations. The Gaussian plume formula is recommended for calculating fog concentrations from which visibility can be estimated. For drift droplets with diameters greater than 200 micron, deposition is calculated by ballistics methods, knowing the environmental wind speed, relative humidity, and the vertical velocity of the plume and the droplet. Evaportation of the droplets is accounted for. Drift droplets with diameters less than 200 micron are assumed to be dispersed according to the Gaussian plume formula, with the plume tilted downward to account for the settling speed of the droplet. (Author abstract)

42795 **APTIC NO. 66118**

Idso, Sherwood B.

THERMAL BLANKETING: A CASE FOR AEROSOL-INDUCED CLIMATIC ALTERATION. *Science, 186(4158):50-51, Oct. 4, 1974. 6 refs.*

Mean monthly values of maximum and minimum temperatures for the Phoenix, Arizona area from 1918 to the present are analyzed by linear regression for the periods before and after 1946 and related to vertical redistributions of aerosols over Phoenix. Changes in warming rates after 1946, a sharp inflection point in population growth, relative to those prior to 1946 are plotted as a function of the percentage of time of inversion existence; and a good curvilinear relation results, where the relative warming trend increases with the increasing percentage of inversion existence time. The restriction of aerosols to low levels of the atmosphere as a result of human activity directly affects the climate at the earth s surface, causing mean air temperatures to rise significantly.

42796 **APTIC NO. 66272**

Khrgian, A. K.

THE EARTH S OZONE SHIELD. *Priroda, no. 11, 1973. Translated from Russian. Joint Publications Research Service, Arlington, Va., 11p., March 4, 1974. NTIS: JPRS 61377*

The ozone shield of the middle and upper atmosphere is considered in terms of its influence on the heat balance of the earth and in terms of photochemical assault by supersonic aircraft emitting nitrogen oxides. The ozone-destructive effect of supersonic aircraft is cited as being theoretically very strong in the lower stratosphere, at altitudes up to 15-20 km, where the main part of the ozone layer exists. The influence of such atmospheric poisoning in the polar and temperate latitudes, where a considerable part of the ozone is situated specifically at these altitudes, is estimated to be capable of decreasing the quantity of ozone by 40-50%. A lessening in the protective layer of ozone will result in a gradual prolonged increase in dangerous solar ultraviolet radiation.

42797 **APTIC NO. 66222**

Mammarella, L., D. Brocco, and A. Biondi

THE BEHAVIOR OF AIR POLLUTANTS IN THE LOWER LAYERS OF URBAN ATMOSPHERE. *(Il comportamento degli inquinanti aerodiffusi nei basi strati di atmosfera urbana). Text in Italian. Rass. Chim., 26(1):41-48, Jan./Feb. 1974. 13 refs.*

A comparative view of atmospheric pollution connected with heavy urban traffic is presented. Authors sampled air 4 and 12 above highways in 2 series of samplings over a 4-month period. The pollution at the 4-meter level was always constant and higher than at the 12-meter level at a 2:1 ratio. Automotive pollution diminishes quickly above ground only when atmospheric conditions are stable even in the presence of other pollutants encountered at higher distances.

42798 **APTIC NO. 66431**

Meszaros, E.

ON THE SPRING MAXIMUM OF THE CONCENTRATION OF TRACE CONSTITUENTS IN ATMOSPHERIC PRECIPITATION. *Tellus (Uppsala), 26(3):402-407, 1974. 6 refs.*

The annual trend of the concentrations of different chemical components of atmospheric precipitation collected in different parts of Europe is discussed. The data show a characteristic spring maximum. On the basis of this finding, the role of stratospheric ozone in the removal of tropospheric trace constituents is postulated. The stratospheric ozone has a maximum level in the troposphere during the spring. The ozone oxidizes sulfur dioxide and nitrogen oxides in cloud and precipitation water. This results in the formation of sulfuric and nitric acids which decreases the pH of the water. The increase of the concentration of hydrogen ions enhances the absorption rate of ammonia gas and the conversion rate of soil origin particulate materials (calcium carbonate) to water soluble compounds. Thus, the concentration of chloride ions in precipitation seems to be independent from this process. The spring maximum is the most general for sulfate ions, which makes it possible that the reaction between O3 and SO2 is faster than that between O3 and nitrogen dioxide; another possible explanation may be the lack of NOx in cleaner atmosphere. The lack of atmospheric calcium and ammonia compounds during the spring in the test area may also explain why no spring maximum was found for these components at these stations. Although the spring maximum is caused by stratospheric O3, the process also depends on the available concentration of trace constituents coming from the Earth s surface.

42799 **APTIC NO. 66250**

Newell, Reginald E., George J. Boer, Jr., and John W. Kidson

AN ESTIMATE OF THE INTERHEMISPHERIC TRANSFER OF CARBON MONOXIDE FROM TROPICAL GENERAL CIRCULATION DATA. *Tellus (Uppsala), 26(1-2):103-107, 1974. 19 refs.*

Mean meridional wind data at the equator and carbon monoxide concentration data are used to estimate a mean annual flux of CO into the Southern Hemisphere of 5 times 10 to the 6th power g/sec. Essentially all the CO observed in the Southern Hemisphere may originate in the Northern Hemisphere because of the greater abundance of automobiles and stationary sources. Each automobile emits 1 ton of CO/hr. With similar loss rates in both hemispheres the total production in the Northern Hemisphere is estimated at 580 million tons/yr which compares with 330 million tons produced from anthropogenic sources. Mean CO residence times are estimated at 0.8 yr and 0.6 yr in the Southern and Northern Hemispheres, respectively. (Author abstract modified)

42800 **APTIC NO. 65980**

Nordo, Jack

MONITORING AIR POLLUTANTS ON MESOSCALES (20 KM-500 KM) AND ON LARGE SCALES (500 KM-5000 KM). *Autom. Air Qual. Monit. Syst., Proc. Conf., Bilthoven, Netherlands, 1973, p. 71-79, 1974. (June 5-8.)*

On 20-50 and 500-5000 km scales it is possible to compute diffusion by deterministic equations, providing there is information on the instantaneous wind fields. The winds may also be derived from other meteorological parameters, using the equations of motion and thermodynamics. A brief account is given of a study on the long-range mass transport of air pollutants involving 50 stations measuring daily concentrations of various sulfur compounds. Equations are given for predicting SO2 concentrations, diffusion, and transport. A statistical approach based on calculations of backward trajectories of air parcels passing a given monitoring station every 6 hr is also described. Data processing procedures for the research project are described. The precipitation, sulfate and sulfur dioxide mixing ratios, sources, and transport of pollution over Europe are discussed.

42801 **APTIC NO. 66257**

Oka, Tatsuo

RESEARCH ON THERMAL ENVIRONMENT IN URBAN AREA. *(Toshi no okeru netsuteki kankyo ni kansuru kenkyu sono 1--netsu kakusan no kiso riron kaiseki). Text in Japanese. Obayashi-gumi Gijutsu Kenkyusho-ho (Rep. Eng. Res. Lab., Obayashi-gumi, Ltd.), no. 9:148-151, 1974.*

Thermal diffusion phenomena are examined theoretically using a case study of an imaginary urban area. Thermal distribution maps, distribution maps of pollution concentration, and change in wind velocity due to natural convection are described. The thermal environment of municipal activities and their discharge systems were studied. The heat discharged from ground surfaces, diffusing into the atmosphere, produces a thermal environment. In urban areas, heat island phenomena are due to a decrease in cooling ability because of construction materials different from green tracts and to large amounts of energy consumption.

42802 **APTIC NO. 66159**

Ostergaard, Knut

THE PROBLEM OF REGIONAL TRANSPORTATION OF AIR POLLUTANTS IN NORTHERN EUROPE. *Clean Air, 8(2):30-32, May 1974. 16 refs.*

Air pollution in northern Europe and regional transportation of air pollutants are discussed. Air pollution in northern Europe is subject to seasonal and long term variations. In Copenhagen, the sulfur dioxide level has remained largely constant during 1967-1972 at an annual average of 60 micrograms/cu m, whereas the particulates level decreased markedly from an annual average of 60 micrograms/cu m in 1967 to 20 micrograms/cu m in 1972. Sulfur dioxide pollution in the industrial area of Rotterdam decreased from 261 micrograms/cu m in 1962 to 183 micrograms/cu m in 1968. Despite restrictions on sulfur content in fuel oil in the Scandinavian countries, emissions of SO2 from stationary combustion will double from 1968 to 1980 if no special control measures are taken. This is a matter of concern particularly in Norway and Sweden where acidified precipitation, possibly transported from industrial areas in Central Europe and England result in damage to fish populations and forest. (Author abstract modified)

42803 **APTIC NO. 66241**

Porch, W. M.

FAST-RESPONSE LIGHT SCATTERING MEASUREMENTS OF AEROSOL SUSPENSION IN A DESERT AREA. *Atmos. Environ., 8(9):897-904, Sept. 1974. 14 refs.*

Suspension studies of aerosols generated by wind over land have used collection techniques such as saltation, surface creep samplers, filters, and impaction samples in the past. Although these sampling methods are simple and dependable in harsh environments, the sampling times are long and the methods are generally used on the largest particles because of their importance to erosion problems. Because of these deficiencies, a field experiment was conducted to test the applicability of a fast-response instrument for measuring light scattering by aerosols. The instrument was an integrating nephelometer. Aerosol suspension and resuspension by diurnal winds in the desert occurred in relatively concentrated puffs of dust of short duration (less than or equal to 2 min). The frequency of these puffs appeared to be related to the meteorological conditions of the area. On chance occasions, dust devils were observed by the instrumentation, exhibiting aerosol characteristics appreciably different from those of diurnal wind-suspended particulates. (Author abstract modified)

42804 **APTIC NO. 66293**

Reck, Ruth A.

AEROSOLS AND POLAR TEMPERATURE CHANGES. *General Motors Corp., Warren, Mich., Physics Dept., Res. Pub. GMR-1664-13p., Aug. 5, 1974. 14 refs.*

Calculations were performed to investigate the possibility that aerosols over the polar regions were directly responsible for the recent ice and snow increase. A radiative-convective atmospheric model was used to calculate the role of atmospheric aerosol particles at 85 deg N latitude and 95 deg S latitude. The calculation involved the forward time integration of the radiation flux imbalance between solar and terrestrial fluxes calculated at nine different points along the vertical direction, with an appropriate temperature change at each time interval until an asymptotic approach to a steady-state temperature profile was obtained. The temperature sensitivity was an order of magnitude greater at 85 deg S latitude than at 85 deg N latitude, and it appeared that aerosols were directly responsible for the increase in ice abundance in the northern hemisphere.

42805 **APTIC NO. 66417**

Rzekiecki, R. and J. Brun

IN SITU TRACING SIMULATION TECHNIQUE FOR ATMOSPHERIC POLLUTANT DISPERSION STUDY. *(Technique de simulation per tracage in situ de la dispersion des pollutants dans l atmosphere). Text in Franch. Bull. Informa. Sci. Tech. Commis. Energ. At. (Fr.), 191:41-51, April 1974. 10 refs.*

In situ tracing techniques and procedures for an air pollutant dispersion study, and newly developed tracer substances and analytical methods are described. The tracers are emitted at the emission source to be studied, and tracer samples are taken by a sampling network in the wind direction at distances of up to 30 km. At the same time, meteorological data is also recorded. Fluorescein sodium is most commonly used as a tracer aerosol for dispersion studies. More expensive tracers, such as gold and indium aerosols, to be determined by gamma spectrometry after sampling and irradiation, have been developed recently. Indium aerosols are especially suitable for tracing hot smoke as emitted from refinery torches. Another gaseous tracer, silicon hexafluoride, can be measured at very great sensitivity by gas chromatography with an electron capture detector.

42806 **APTIC NO. 66378**

Smith, D. W. and G. C. Bowes

LOSS OF SOME ELEMENTS IN FLY-ASH DURING OLD-FIELD BURNS IN SOUTHERN ONTARIO. *Can. J. Soil Sci., vol. 54:215-224, May 1974. 19 refs.*

The effect of wind transported fly ash on nutrients from a burned area was investigated in a series of 11 surface burns at two locations in southern Ontario. The amounts of total potassium, calcium, magnesium, and phosphorus were calculated on a unit area basis for the biomass both before and after burning at both burn sites. Differences in the amounts present in the litter and ash before and after burning revealed a considerable loss of nutrients. The amounts of nutrient loss ranged between 40 and 50% of the original in the biomass on the two burn dates at one location and was over 50% at the other location. Losses were due to volatilization and as windblown fly-ash. The latter was more important since all burns were of low intensity, not exceeding a surface temperature of about 500 C. As much as 30% of the loss was recovered in downwind deposits of fly-ash adjacent to the burned areas. (Author abstract modified)

42807 **APTIC NO. 66251**

Weinstock, Bernard and Tai Yup Chang

THE GLOBAL BALANCE OF CARBON MONOXIDE. *Tellus (Uppsala), 26(1-2):108-115, 1974. 29 refs.*

The residence time of carbon monoxide in the troposphere was determined using radioactive 14CO produced by cosmic ray neutrons as a tracer. The production rate of stable CO can also be derived. The rate is an order of magnitude greater than that estimated for CO sources such as the oceans, combustion, and chlorophyll decay. The oxidation of tropospheric methane initiated by hydroxyl radicals can account for this predominant source of CO in nature. The hydroxyl radical also provides the major removal mechanism for CO oxidation to carbon dioxide to maintain the CO balance in nature. (Author abstract modified)

42808 **APTIC NO. 66306**

Wofsy, Steven C., Michael B. McElroy, and Nien Dak Sze

FREON CONSUMPTION: IMPLICATIONS FOR ATMOSPHERIC OZONE. *Preprint, Harvard Univ., Cambridge, Mass., Center for Earth and Planetary Physics, 14p., Sept. 25, 1974. 15 refs.*

Freon consumption is discussed in relation to its effect on atmospheric ozone. Freons are a potential source of stratospheric chlorine and may thus indirectly cause serious reductions in the concentration of ozone. Six conceptual models for the future global consumption of Freon are investigated and show that ozone reduction could be as large as 3% by 1980 and 16% by the year 2000 if Freon consumption were to grow at 10% per year. One of the models show that if the decision to eliminate Freon were postponed until 1995, the reduction in ozone could exceed 10% and would be significant for as long as 200 years after termination of Freon use. (Author abstract modified)

1973

42809 **APTIC NO. 66535**

Esmen, Nurtan A.

ATMOSPHERIC SCAVENGING OF SOLUBLE AND INSOLUBLE MATTER. *Sci. Total Environ., vol. 2:181-189, 1973. 9 refs.*

Retention efficiency of insoluble particle scavenging by rainfall and in-cloud and below-cloud fractions of scavenging for both soluble and insoluble particles were experimentally determined for rainfall rates of about 1 mm/hr. The retention efficiency was 0.90 which is in good agreement with previous theoretical work. In-cloud scavenging appears to be the dominant factor in the removal of both soluble and insoluble matter from the atmosphere. The in-cloud contribution of both soluble and insoluble particulates is significantly larger than the below-cloud contribution, with the retention efficiency of below-cloud processes being higher. (Author abstract modified)

42810 **APTIC NO. 66248**

Fukuoka, Yoshitaka and Kaoru Tanaka

AIR POLLUTION AND MICROMETEOROLOGY IN AND AROUND A TUNNEL. *(Tonneru naigai no taki osen to bikisho). Text in Japanese. Chirigaku Hyoron (Geograph. Rev. Japan), 46(8):550-554, Aug. 1973. 10 refs.*

Carbon monoxide and nitrogen dioxide concentrations in and around the Shinobu-yama tunnel used for automobile traffic are summarized. Nitrogen oxide concentration seems to re related to sunshine and photochemical reactions occurring outside the tunnel, while the distribution of pollutants in the tunnel is controlled by the wind direction. Empirical equations relating to ventilation volume, traffic density, and tunnel length indicate the need for artificial ventilation by fans. Results of wind tunnel equipment measurements concerning the relationship between the wind in and around the tunnel are also presented. Pollutant distribution in the tunnel is estimated from the air-temperature distribution given.

42811 **APTIC NO. 62637**

Gronskei, Knut Erik

A SYSTEMATIC APPROACH TO THE STUDY OF THE CONNECTION BETWEEN EMISSION AND AMBIENT AIR CONCENTRATIONS: SIMULATION OF THE SHORT TERM VARIATION OF THE SO2 CONCENTRATION IN OSLO IS USED AS AN EXAMPLE. *North Atlantic Treaty Organization, Neuilly sur Seine (France), Advisory Group for Aerospace Research and Development, Proc. AGARD Propul. Energ. Panel Meet., London, England, 1973, AGARD-CP-125, p. 23-1-23-10. 2 refs. (April 9-13.)*

NTIS, DDC: AD-769 278

A systematic approach to study the effect of complex source distribution on the ambient air quality is described. Measurements of emissions, meteorological parameters, and ambient air concentrations are used to develop a quantitative model describing the important physical and chemical processes. The model is mathematically formulated in a modified form of the continuity equation for the pollution component. To improve the model, regression analysis can be used. An example of this approach is given in the study of air pollution in Oslo where a systematic vertical motion is the most important process to clean the air in Oslo during inversion situations. The development and use of a model for an airfield will give information about local air pollution distribution as a result of different activities in connection with the airfield. This information may be used to reduce the local ambient air concentrations effectively. The model will estimate trends in the ambient air concentrations as a result of emission tendencies. The contribution of the air pollution from an airfield as a whole on a regional scale compared to other sources may be clarified by a relevant model on this scale. (Author summary modified)

42812 **APTIC NO. 66461**

Hanna, Steven R. and Steven G. Perry

METEOROLOGICAL EFFECTS OF THE COOLING TOWERS AT THE OAK RIDGE GASEOUS DIFFUSION PLANT. PART I: DESCRIPTION OF SOURCE PARAMETERS AND ANALYSIS OF PLUME PHOTOGRAPHS AND HYGROTHERMOGRAPH RECORDS. *National Oceanic and Atmospheric Administration, Oak Ridge, Tenn., Air Resources Atmospheric Turbulence and Diffusion Lab., Rept. 86, 41p., Dec. 1973. 9 refs.*

Measurements of source parameters, downwash criteria, visible plume dimensions, and water deposition rate were taken at the Oak Ridge Gaseous Diffusion Plant to investigate the meteorological effects of cooling towers associated with the facility. Sensible heat flux from each cell was about 2 MW, and mass median drop size was 1000 micron. Maximum observed water vapor concentration at the ground near the towers was 0.005 gm H_2O/gm air. About 10% of the time, the cooling tower plumes were observed to initiate cloud development, with the typical final plume rise being about 100-200 m. Observed visible plume length and height were in agreement with the prediction of a theoretical model if it is assumed that the plumes from individual cells combine. Liquid water deposition rates on the tower walkway and on the ground within 30 m of the tower were in the range of .2-30 micrograms/sq cm sec and averaged about 7 micrograms/sq cm sec. Mass median drop size was about 1000 micron on the walkway and 450 micron at distances up to 30 m from the tower.

42813 **APTIC NO. 66255**

Ishihara, Y., H. Shikata, T. Tanaka, T. Fujiwara, and H. Kobayashi

REACTIONS AND SCAVENGING PROCESSES FOR NITROGEN OXIDES IN ATMOSPHERE. *(Taikicha ni okeru chisso sankabutsu no kyodo). Text in Japanese. Denryoku Chuo Kenkyu sho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. (No. 1) Electric Power Ind., Rept.), 64p., Dec. 1973. 42 refs.*

The chemical reactions and scavenging processes for atmospheric nitrogen oxides are discussed. Specific topics include: natural circulation of nitrogen compounds; sources and amounts of pollutant NOx; atmospheric reaction of NOx; absorption by water surfaces such as sea, lake, river; absorption by plants; absorption by water droplets such as rain and fog; and an atmospheric diffusion equation including the effects of pollutant absorption.

42814 **APTIC NO. 66228**

Kawaguchi, Hiroshi

BORON CONTENT OF ATMOSPHERIC FALLOUT. *(Koka baijin no hoso ganyuryo). Text in Japanese. Chikyu Kagau (Earth Sci.), 6(1): 1-4, 1973. 11 refs.*

Extraction and spectrophotometry are used to determine the boron content of atmospheric fallout ignited during a study of the relationship between the amount of fallout boron and wind direction, rainfall, and calcium and magnesium contents. Boron content is inversely proportional to rainfall and directly proportional to calcium content, with both boron and calcium contents being high from late autumn to winter and low from summer to early autumn. Boron content is also greater with a northerly wind as opposed to a southerly one. The amount of illite in ignited atmospheric fallout is also related to boron content.

42815 **APTIC NO. 66482**

Manowitz, B. and L. Newman

FIELD MEASUREMENT OF RATES OF OXIDATION OF SO2. *Preprint, Brookhaven National Lab., Upton, N. Y., 9p., June 1973. 4 refs.*

NTIS: BNL 17977, CONF-730720-2

Field measurements of the rate of oxidation of SO2 in coal- and oil-fired plumes were conducted in the vicinity of Pennelec Company s Keystone Station in Indiana, Pennsylvania and Lilco s Northport Station, Northport, New York. Oxidation rates were investigated for distances up to 20 km from the stacks by direct measurement of SO2 and sulfate concentrations, by measurement of the ratio of SO2 to sulfur hexafluoride (injected in the stack gases), and by measurement of the isotopic ratio of S32 and S34 in plume SO2. Results from eight successful runs at the Northport oil fuel station indicate that the data can be fitted best by a second order mechanism with a rate constant equal to 1 plus or minus .8/ppm hr; SO2 appears to react with an active oxidant which is dispersed in the same manner, perhaps being associated with the active particles in the plume that are known to have a high vanadium content. Data from 14 successful runs at the Keystone coal-fired station indicate SO2 conversions usually less than 5%, even at a distance of 10 miles. A typical set of data are presented for each plant.

42816 **APTIC NO. 66388**

Martens, Christopher S. and Robert C. Harriss

CHEMISTRY OF AEROSOLS, CLOUD DROPLETS, AND RAIN IN THE PUERTO RICAN MARINE ATMOSPHERE. *J. Geophys. Res., 78(6):949-957, Feb. 20, 1973. 39 refs.*

The chemical changes occurring during the transformation of aerosols to cloud droplets and rain were measured in orographic clouds on the eastern end of the island of Puerto Rico. Comparisons of elemental ratios in particles and rain and of elemental particle size distributions in and out of the clouds demonstrated scavenging efficiencies of greater than 100% for the elements iodine, bromine, and chlorine relative to sodium and of less than 25% for the elements aluminum, manganese, and vanadium relative to Na. These different scavenging efficiencies were consistent with predictions based on existing cloud physics theory and were a reflection of the geochemical properties of the aerosol consisting partly of a hygroscopic sea salt component containing I, Br, Cl, and Na and partly of a soil dust component containing Al, Mn, and possibly V. (Author abstract)

42817 **APTIC NO. 62547**

Savchenko, A. V. and V. V. Smirnov

SOME REGULARITIES OF THE SPATIAL DISTRIBUTION OF CLOUD PARTICLES. *(O nekotorykh zakonomernostyakh prostranstvennogo raspredeleniya oblachnykh chastits). Text in Russian. Inst. Eksp. Meteorol., 4(38):111-116, 1973. 7 refs.*

The regularities of the in-space distribution of cloud particles in the 3-22-micron size range were studied by actual measurements in a small-volume particle counter. The Poisson distribution can be used as a statistical model for the description of the in-space distribution of such particles during the formation and dissipation of adiabatic fog. No noticeable interaction, and especially no electric interaction, between the fog particles in the counter chamber was observed. Cloud media formed in small-volume chambers can be regarded as statistically homogeneous systems.

42818 **APTIC NO. 66199**

Zhigalovskaya, T. N., S. G. Malakhov, V. V. Yegorov, A. I. Shilina, and E. P. Makhon ko

CERTAIN CHARACTERISTICS OF THE GLOBAL CONCENTRATION DISTRIBUTIONS OF MICROELEMENTS IN THE LOWER TROPOSPHERE. *Bull. Acad. Sci. (USSR) Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk. SSSR, Fiz. Atmosfery i Okeana), 9(7):775-780, July 1973. 10 refs.*

The distribution of microelement concentrations of lead, molybdenum, tin, cobalt, vanadium, cadmium, titanium, iron, manganese, nickel, aluminum, and copper in the lower troposphere is studied in reference to air in the polar regions, over the territory of the USSR, and at the centers of oceans. Average microelement concentrations in the surface layer of air decrease steadily with increasing distance from the continental pollution source, with the lowest metal concentrations being observed in the polar region of the Northern hemisphere. Transport of impurities from the continents by zonal air flows has a significant influence on the microelement levels in the surface air over oceans in the Northern Hemisphere which are generally higher than concentrations over the oceans of the Southern Hemisphere. A substantial part of the lead and cadmium in the air over the oceans and over the polar regions evidently originates from industrial pollution.

42819 **APTIC NO. 64627**

Kanagawa Prefectural Government (Japan), Pollution Countermeasures Office and Japan Meteorological Society

THE RETENTION AND DISTRIBUTION OF AIR POLLUTANTS IN THE KANAGAWA PREFECTURE. *(Kanagawas-ken ni okeru taiki osen busshitsu no tairyu bunpu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawaski Ind. Area), no. 15:127-134, Feb. 1973.*

The relationships between the air pollution and maximum temperature minimum temperature, diurnal range, and land and sea breeze in Kanagawa prefecture (eastern region) were investigated. At 71 measuring points, the maximum and minimum temperatures were measured for 62 days during July and August 1971. The distribution of monthly average maximum temperature and diurnal range are shown in diagrams. The higher temperature region corresponds to the region with lower diurnal range and the lower temperature region to the region with higher diurnal range. The high oxidant concentration area occurred in the region with a lower diurnal range contrary to the existing theory that the high oxidant concentration was associated with high diurnal range. The northbound sea breeze has an effect of lowering the temperature in the inland area. Four regions with high oxidant concentrations were selected, and the weather map, maximum temperature distribution, and streamline map of a typical high oxidant pollution day from each region were analyzed. The high oxidant pollution areas were located in the lower temperature region of the maximum temperature distribution map. The high oxidant pollution is more likely to occur at the inland area in a cloudy day with low wind velocity of northbound sea breeze, and at the coastal area on a clear day with high wind velocity of northbound sea breeze.

1972

42820 **APTIC NO. 66313**

Caro, J. H., A. W. Taylor, and E. R. Lemon

MEASUREMENT OF PESTICIDE CONCENTRATIONS IN THE AIR OVERLYING A TREATED FIELD. *Proc. Int. Symp. Ident. Meas. Environ. Pollut., Ottawa, Ontario, 1972, p. 72-77. 10 refs. (June 1971.)*

Dieldrin and heptachlor were collected on filters at several heights over corn fields during 1968 and 1969 and measured by gas chromatography in an investigation of the fate of field-applied organochlorine insecticides. Parallel measurements of moisture gradients were made to permit calculation of pesticide flux rates out of the soil or the crop canopy. Pesticide losses to the air for the entire growing season were estimated by interpolation from the flux data for several sampling days. Only traces of heptachlor and dieldrin were found in prefilter dust traps, indicating that transport of pesticides on dust particles was unimportant; while, by contrast, vaporized pesticide concentrations in hexylene glycol traps were high. Results from the 1968 experiments showed significant condensation of airborne pesticides on exposed surfaces; findings from the 1969 experiments showed that 2.8% of the dieldrin and 3.9% of the heptachlor applied to the field were evolved to the air, indicating that vaporization was a major pathway of insecticide loss from field soils.

42821 **APTIC NO. 66287**

Corrin, M. L.

ATMOSPHERIC CHEMISTRY AND PHYSICS OF AUTOMOTIVE LEAD. *In: Impact on Man of Environmental Contamination Caused by Lead. Interim Rept., July 1, 1971-June 30, 1972, p. 70-81, 1972.*

Automotive lead is discussed in terms of service functions, chemical transformations of atmospheric Pb compounds, particle size determination, and washout efficiencies in automotive exhaust. The chemical transformations are studied in a flow system with lead bromochloride; changes of the solid are examined by X-ray diffraction and of the gas by gas chromatographic techniques. Particle size determination utilize the Andersen impactor with Teflon collector plates. This method is suitable for sampling times as low as 30 min. Washout efficiencies are on the order of 0.0004. With such efficiencies the washout process leads to an almost negligible Pb removal process from the atmosphere and cannot account for the Pb concentrations measured in rainfall. The rainout process must enter strongly in the removal mechanisms. (Author abstract modified)

42822 **APTIC NO. 63001**

Grobecker, Alan J.

CHAIRMAN S ADDRESS. *Dept. of Transportation, Cambridge, Mass., Transportation Systems Center, Proc. Conf. Clim. Impact Assess. Program, 2nd, Cambridge, Mass., 1972, DOT-TSC-OST-73-4, p. 2-12. 8 refs. (Nov. 14-17.) (Available from the National Technical Information Service.)*

Monographs issued by the Climatic Impact Assessment Program on the interrelation of the stratosphere and troposphere are summarized. A monograph described simulation of the circulation of the 1990 and 2020 tropospheres under the assumption that the radiation will be described for the perturbed stratosphere. Two different dates are necessary within the perturbed troposphere to distinguish the immediate effect of changes in heating from the longer term effect of a progressive cooling of the oceans, which is a slowly felt effect of heat reduction. Another monograph describes the effects of increased ultraviolet radiation on man, animals, and plants, the biological effects of other changes in solar radiation, and thy effects of various climatic changes on agriculture.

42823 **APTIC NO. 66344**

Kondratyev, K. Y.

RADIATION PROCESSES IN THE ATMOSPHERE. *Geneva (Switzerland), World Meteorological Organization, 1972, 248p. 613 refs.*

NTIS: N74-17337

Radiation processes in the atmosphere are reviewed. Topics covered include: the solar constant; radiation characteristics of the underlying surface; radiation climatology of the earth; atmospheric aerosols and their influence on radiation transfer; and radiation, thermal regime, and dynamics of the atmosphere. Atmospheric aerosols are considered in terms of vertical distribution, size distribution, chemical composition, complex index of refraction, vertical profiles of radiation fluxes and aerosol structure of the troposphere and stratosphere, and the incorporation of the radiative flux divergence in models of the general circulation.

42824 **APTIC NO. 63022**

Rosenberg, N. W., R. E. Good, and S. P. Zimmerman

TRANSPORT MEASUREMENTS IN THE STRATOSPHERE. *Dept. of Transportation, Cambridge, Mass., Transportation Systems Center, Proc. Conf. Clim. Impact Assess. Program, 2nd, Cambridge, Mass., 1972, DOT-TSC-OST-73-4, p. 247-253. 6 refs. (Nov. 14-17.) (Available from the National Technical Information Service.)*

The atmospheric transport processes were determined in the 15-30 km altitude region where SST (supersonic transport) emission products are deposited. The experiments are designed to provide simultaneous measurements of temperature, wind velocity, and ozone concentration. The eddy diffusion coefficient will be estimated independently from fluctuations in wind shear, photographic trail image density, and temperature. Studies will extend to the higher altitudes to which these products may be carried by transport processes. Field trips are scheduled for January and July 1973 to examine seasonal differences; techniques developed by the Air Force Cambridge Research Labs will be used for dispensing, observing, and analyzing visible trails of smoke tracers for flow fields to scales as small as a few meters. (Author abstract)

42825 **APTIC NO. 62685**

Schneider, Stephen H. and William W. Kellogg

THE CHEMICAL BASIS FOR CLIMATE CHANGE. *In: Chemistry of the Lower Atmosphere. S. I. Rasool (ed.), New York, Plenum, 1972, Chapt. 5, p. 203-249. 75 refs.*

Natural and man made influences on atmospheric composition are discussed in a review of the chemical basis for climatic change. It is obvious that the air over large cities has been markedly changed by the contaminants that pour from smokestacks and exhaust pipes. For the atmosphere on a global scale man s activities become considerably less obvious and include: the particles that man introduces directly or indirectly from gaseous contaminants that subsequently turn into particles; the carbon dioxide content of the atmosphere which has been increasing due to the burning of fossil fuels; and possible influences on the stratosphere from high flying aircraft. An increase in CO2 concentration in the atmosphere of 20-25% by 2000 is predicted from energy generation and other fossil fuel requirements. This is expected to increase the infrared absorbing gas in the neighborhood of 0.5 C in midlatitudes. The largest source of particles in the lower atmosphere is soil and rock debris, man made contributions can account for from 5-50% of the total mass of suspended particles.

42826 **APTIC NO. 62267**

Zuyev, V. Y.

LASER SOUNDING OF THE ATMOSPHERE. *(Lazernoye Zondirovaniye Atmosfery). Priroda, no. 10:86-93, Oct. 1972. 1 ref. Translated from Russian, Techtran Corp., Silver Spring, Md., 18p., June 1973. (National Aeronautics and Space Administration Technical Translation F-14,948, Contract NASW-2485.)*

NTIS: N73-26391

Laser sounding of the atmosphere is discussed as a good prospective method for forecasting weather and for determining levels of atmospheric pollution. Registering and interpreting the traces of interaction of laser pulses with atmospheric layers gives information concerning pressure, density, temperature, humidity, the wind, concentrations of various gaseous components in the atmosphere, stratification of aerosol layers, concentrations and spectra of the sizes of aerosol particles of all types of clouds including silver clouds, fogs, smokes, dust, and hazes. A method fo quantitatively estimating atmospheric pollution based upon the use of lasers is an extremely perspective one. The space time structure of pollution can be investigated and pollution of the free atmosphere in any localization of a particular region accessable to the laser pulse can be quantitatively evaluated. The perspective nature of the method of laser sounding of atmospheric pollution is based upon its extremely high sensitivity. The locator catches the echo signal from invisible particles of aerosols in relatively small concentrations. As data demonstrates, pollution creates strong echo signals which are detected by locators with the quite modest energetic characteristics of the lasers. (Author abstract modified)

1968

42827 **APTIC NO. 66006**

Angstrom, Anders

THE AEROSOL CONCENTRATION WITHIN DIFFERENT LAYERS OF THE ATMOSPHERE AS DERIVED FROM OPTICAL AND PYRHELIOMETRIC MEASUREMENTS. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 289-290. (Aug.)*

The aerosol concentration with different layers of the atmosphere was developed as derived from optical and pyrheliometric measurements. The values of the aerosol concentration suggest a classification of the atmosphere according to the aerosol conditions. A bottom tropospheric layers exists between the ground and up to about 4-5 km where the effect of the eddy convectivity is counterbalanced not only by the regular fall of the isolated aerosol particles, but also by the effect of condensation and fall of rain. An upper tropospheric layer exists between 5-12 km where the aerosol density is practically proportional to the air density. A stratospheric layer exists between 20-35 km where the eddy convectivity is rather low.

42828 **APTIC NO. 65993**

Antipov, B. A., V. E. Zuev, A. V. Sosnin, V. A. Sapozhnikova, and S. S. Khmelevtsov

EXPERIMENTAL STUDY OF RADIATION ATTENUATION IN THE ATMOSPHERE ON THE BASE OF LASERS. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 151-153. (Aug.)*

Data on the experimental investigations of laser radiation absorption in the laboratory and in the ground layer are reported. The measurements of laser radiation absorption coefficients at 1.15 micron and 3.39 micron were made using a multiple-pass cell which obtained the path length from 8 to 120 m. The measurements of the ground layer transmission for various laser radiations were conducted at path lengths of 0.2, 0.5, 1.2, and 3.5 km. In order to divide the measured attenuation into the molecular absorption and aerosol scattering components the measurements of atmospheric transmission for thermal source radiation were made simultaneously using an interference filter with a maximum transparency at the laser radiation line.

42829 **APTIC NO. 66024**

Avaste, O.

RADIATIVE TRANSFER OF SOLAR RADIATION IN THE ATMOSPHERE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 511-516. 11 refs. (Aug.)*

A method for determining the solar radiation flux divergence and a method for calculating the spectral distribution of direct solar radiation and of diffuse radiation at different altitudes is developed. A standard atmospheric model was used in which the concentration of carbon dioxide (by volume) is constant at 0.033%, the aerosol concentration exponentially decreased with height, and the total amount of ozone is 0.25 atm cm. An approximation formula which can be used in numerical weather forecasting experiments is deduced for calculating the integral values of short wave flux divergences. Geographical and seasonal distributions of the daily sums of solar radiation absorbed in the atmosphere were calculated. The vertical distribution of flux divergences for the clear sky as well as for the overcast sky is examined. (Author abstract modified)

42830 **APTIC NO. 66004**

Bary, Elisabeth de

DIURNAL VARIATION OF SKYLIGHT AND SKYLIGHT POLLARIZATION. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 279-281. 3 refs. (Aug.)*

The diurnal variations of skylight and skylight polarization were investigated. Measurements were made at the Izana Observatory on the Canary Islands on March 31, 1968. The atmospheric conditions remained almost constant during the entire day; the visibility was more than 100 km, and a strong north-west breeze carried genuine Atlantic air to the measuring site. The radiance measurements in the solar almucantar show that the turbidity was small and that the aerosol particle size distribution followed a power function with a large exponent. Measurements were also made of the aerosol particle size distribution with several impactors on an optical particle counter. Air chemical measurements were made. Weather situations like that of March 31 induce an aerosol particle size distribution following a power function which is superimposed on a

Gaussian distribution with the mode at a radius of 2 micron. The particle of this superimposed function are due to the local lava dust.

42831 **APTIC NO. 66010**

Bricard, J., M. Fournet, and J. Lenoble

STUDY OF LUMINOUS FLUXES DIFFUSED AND TRANSMITTED WITHIN A LAYER OF ILLUMINATED FOG. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 311-315. 3 refs. (Aug.)*

Luminous fluxes diffused and transmitted with a layer of illuminated fog were investigated. The fog, which is produced by pneumatic spray nozzle, is characterized by a classical transmissiometer and by a laser nebulo-granulometer specially designed to operate within a high density aerosol. Directional luminance was measured in every point of the chamber with a nephelometer and luminance polar indicatrices were traced. A fluxmeter made direct flux measurements which were compared to those obtained by digitally integrating indicatrices recorder. At all depths there is a strong remanence of the luminous maximum in the frontal direction. The amplitude of this maximum diminishes according to the classical law of extinction. The reduction of propagated flux that was found can only be accounted for either by an absorption of incident flux by the chamber walls; or by a normal absorption of the flux; by the water droplets.

42832 **APTIC NO. 66011**

Coulson, Kinsell L.

THE INFLUENCE OF SURFACE REFLECTION ON SKYLIGHT. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 317. (Aug.)*

The influence of surface reflection on skylight is discussed. Aerosol scattering in a cloudiness atmosphere containing a non-absorbent continental type aerosol causes a redistribution of the incident radiation and causes significant change s of polarization, but it has little effect on the total downward flux. The scattered component is greatly increased at the expense of the directly transmitted component, but the forward scattering peak is effective in returning radiation to space only at large zenith angles of the sun. Because of the asymmetric scattering pattern, the effects of surface reflection on skylight are influenced a relatively small amount by the aerosol.

42833 **APTIC NO. 65999**

Deirmendjian, D.

SCATTERING AND ABSORPTION PARAMETERS OF CLOUDS AND DUST. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 249-250. 4 refs. (Aug.)*

New results on the theoretical primary scattering and absorption properties of polydisperse clouds and dusts are described. Five additional models are included corresponding to continental and stratospheric aerosols, corona-producing and mother-of-pearl clouds, as well as substances such as silicates, clay, and iron. The complete Mie expressions are integrated over these model distributions to obtain all four Stokes matrix elements as well as the volume extinction and absorption coefficients.

42834 **APTIC NO. 66009**

Devaux, C., J. C. Guillemot, and J. Marengo

COMPARATIVE THEORETICAL AND EXPERIMENTAL STUDIES OF SCATTERING RADIANCE IN A PLANE-PARALLEL MEDIUM. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 305-309. 3 refs. (Aug.)*

A numerical resolution of visible and infrared radiation transfer in clouds was developed. A method was tested in a simple case on an already executed computation and applied to some media, water droplets, clouds, and latex suspensions. The problem of anisotropic scattering was resolved with good approximation. A scattering indicatrix whose development has 25 coefficients was treated.

42835 **APTIC NO. 66002**

Dietze, G.

ON THE AEROSOL FACTOR IN THE TWILIGHT METHOD. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 269-270. (Aug.)*

The behavior of aerosols in the troposphere is discussed. The multiple scattered light even during the middle twilight phases comes mainly from the troposphere if the latter is highly turbid. Because of the correlation between the type of the troposphere air mass and the amount of stratospheric ozone, a variation of the tropospheric aerosol content is connected with a variation of the O3 shadow profile. Significant dust layers in the atmosphere cause a change of the variation of twilight. The variations only occur when the O3 shadow crosses a dust layer. There is a continuous change of polarization over a number of twilight phases that cannot be explained by the influence of the O3 shadow profile upon the primarily scattered light.

42836 **APTIC NO. 66003**

Eiden, Reiner

INFLUENCE OF THE ATMOSPHERIC AEROSOL ON THE ELLIPTICAL POLARIZATION OF SKYLIGHT. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 275-278. 4 refs. (Aug.)*

The influence of the atmospheric aerosol on the elliptical polarization of skylight was investigated. The very turbid atmosphere at Mainz in the heavily polluted Rhine-Main-Area was tested for elliptically polarized skylight. The measurements were made along various horizontal circles of constant elevation angles at a constant wavelength of 0.405 micron. A maximum is located between 40 degrees and 90 degrees. For this maximum in both directions, the ellipticity decreases continuously and sometimes becomes negative. In case of extremely great turibidity, when the visual range was less than 5 km, the measurements did not always show ellipticity.

42837 **APTIC NO. 66017**

Georgievsky, Y. S., G. I. Gorchakov, and G. V. Rozenberg

CORRELATIONS BETWEEN OPTICAL CHARACTERISTICS OF ATMOSPHERIC HAZE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 339-342. 1 ref. (Aug.)*

Relationships between optical characteristics of atmospheric haze are described. The classes of haze include a wide range of atmospheric conditions. The scattering coefficient at a given wavelength varies from haze to haze by more than two orders. The most striking features of hazes is the high correlation of all optical characteristics. The closest correlation is observed between the scattering coefficient and the coefficient of directed light scattering at a certain angle. In the whole range of variations of optical density of haze, the average error of defining the type of the scattering phase function in the range of angles from 10 to 170 degrees at a given coefficient of scattering does not exceed + or - 10%.

42838 **APTIC NO. 66012**

Hovenier, J. W.

MULTIPLE ANISOTROPIC SCATTERING OF UNPOLARIZED AND POLARIZED LIGHT IN CLOUDS. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 319-323. 1 ref. (Aug.)*

The multiple scattering of polarized light in plane parallel homogeneous cloud layers was investigated. The solution for a thin layer (2 to the minus 9th power) was found by calculating only the light which is scattered once and twice. The doubling method is applied and can guarantee the high accuracy that is required when polarization is involved, i.e., at least 0.1%.

42839 **APTIC NO. 66023**

Joseph, Joachim H.

THE EFFECT OF TENUOUS CLOUDS ON THE FLUX OF INFRA-RED RADIATION IN THE ATMOSPHERE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 503-508. 4 refs. (Aug.)*

The effect of tenuous clouds on the flux of infrared radiation in the atmosphere was investigated. Both the observed abnormal heating rates and the observed depressions of the effective ground temperatures were simultaneously related to one and the same agent by the use of approximate scattering laws for water and ice clouds. A model tropical atmosphere was used which included carbon dioxide and ozone and which is characterized by a ground temperature of 300 K and a water vapor mixing ratio of 1.5 times 10 to the minus 2nd power g/g. The present approximation for the scattering behavior of tenuous cloud gives values for both the heating-rates and the effective blackbody temperatures that agree with the experimental results.

42840 **APTIC NO. 66014**

Kasten, Fritz

VARIATION OF THE SCATTERING COEFFICIENT WITH RELATIVE HUMIDITY. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 329-330. 4 refs. (Aug.)*

A theory for the variation of the scattering coefficient with relative humidity is discussed. The scattering coefficient of the air depends on the number and size of the aerosol particles. With increasing relative humidity the aerosol particles grow by soaking. The spectral scattering coefficient is composed of the sum of its molecular or Rayleigh component and its aerosol or dust component. The outlined theory is a fair approximation of the real process of aerosol soaking.

42841 **APTIC NO. 65990**

Kondratyev, K. Y.

GLOBAL ATMOSPHERIC RESEARCH PROGRAMME (GARP) AND RADIATION FACTORS OF WEATHER AND CLIMATE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 23-32. (Aug.)*

The global atmospheric Research Programme (GARP) and radiation factors of weather and climate are discussed including atmospheric aerosol investigations. All essential factors determining general atmospheric circulation are the goal of GARP. The development of indirect optical methods for atmospheric aerosol investigations is urgent in determining the vertical distribution of the aerosol concentration, the size distribution of aerosol particles, and the chemical composition and optical parameters of aerosol particles. Measurement of ozone concentration should be made and aerosol particles sampled in the trophosphere and lower stratosphere to determine the concentration, size distribution, chemical composition, and optical characteristics of aerosol particles.

42842 **APTIC NO. 65991**

Kondratyev, K. Y., L. N. Dyachenko, and K. Y. Vinnikov

THE CLIMATOLOGY OF THE NET RADIATION OF THE EARTH AT THE PRESENT STAGE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 59-65. 10 refs. (Aug.)*

The climatology of the net radiation of the earth is described. The present climate is characteristic of the successful development and application of computational methods for determining the net radiation of the surface atmosphere systems and its compounds. It is also characteristic of the improvement of the vertical balloon and satellite actinometric measurements which make it possible for the first time to find out experimentally the net radiation components. The methods for the interpretation and analysis of the satellite measurement data determine the accuracy of obtaining the net radiation components.

42843 **APTIC NO. 66019**

Marchuk, G. I., G. A. Mikhailov, M. A. Nazareliev, and R. A. Darbinian

SOLUTION OF DIRECT AND SOME INVERSE PROBLEMS OF ATMOSPHERIC OPTICS WITH MONTE CARLO CALCULATIONS OF THE MAIN FUNCTIONAL. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 355-356. 3 refs. (Aug.)*

The solution of direct and some inverse problems of atmospheric optics with Monte Carlo calculations of the main functional is discussed. A general purpose compiling computer program was created on the basis of alpha language. The program makes it possible to compute the field of light intensity, sensitivity of the intensity field towards the change of the different model parameters, and constants for an equivalent model with isotropic scattering. A model inverse problem is solved relative to the coefficients of aerosol scattering at different altitudes in spherical atmosphere.

42844 **APTIC NO. 65997**

Pivovarova, Z. I.

STUDY OF THE REGIME OF ATMOSPHERIC TRANSPARENCY. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 181-185. 3 refs. (Aug.)*

The temporal and spatial distribution of the atmospheric transparency factor for the integral flux of solar radiation was investigated. Maps of the atmospheric transparency factor and aerosol component of radiation extinction were compiled based on the data obtained for the USSR. High aerosol turbidity over ETU, particularly in the southern and central areas, reflects not only the influence of the natural factor-underlying surface (soil dust) but also the atmospheric pollution from industrial sources and high density population. The effects of volcanic eruptions are evident in curves made of radiation variation. The absorption by water vapor is equal to 30-32% of total extinction in the atmosphere; the decrease due to aerosols is equal to 20-25%. If it is assumed that the value of solar constant does not change, the basic cause of an extinction in direct solar radiation is an increase in aerosol turbidity. The aerosol component increased in the period 1954-1963 by 20-30% as compared to the mean value.

42845 **APTIC NO. 65994**

Pokrovsky, A. G. and A. K. Suslov

ON THE CALCULATION OF THE ATMOSPHERIC O2 ABSORPTION SPECTRUM AND CONSTRUCTION OF THE GROWTH CURVE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248 TP 136, p. 155-159. 12 refs. (Aug.)*

Theoretical profiles of the oxygen absorption lines were plotted and compared with the observed data at large dispersion. The comparison of the theoretical growth curve with that observed reveals the equality of the slopes of these curves which testifies to both a high quality of experimental material and the correctness of calculations. Their systematic displacement relative to each other is small. The agreement permits constructing the absolute growth curve, since for a fixed atmospheric model the air mass of the atmospheric layer is uniquely related to the number of molecules of the absorption component in this layer in a simple way.

42846 **APTIC NO. 66015**

Quenzel, H.

OPTICAL DETERMINATION OF THE CONTINUUM-ABSORPTION OF MARITIME AIR MASSES IN THE SPECTRAL REGION OF SOLAR RADIATION. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 331-334. (Aug.)*

The optical determination of the continuum-absorption of maritime air masses in the spectral region of solar radiation was investigated. The radiative transfer in the spectral region of solar radiation can be described by absorption by ozone, absorption by water vapor within the bands, scattering by air molecules, and scattering by aerosol particles. There is an additional real absorption with little or no wavelength dependency called continuum absorption. It can be determined by scattering by air molecules and aerosol particles.

42847 **APTIC NO. 66005**

Rozenberg, G. V.

LIGHT SCATTERING AND AEROSOL. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 285-287. 5 refs. (Aug.)*

Atmospheric formations of haze, foggy haze, and fog are discussed. The nature of optical and meteorological differences of these formations is in the microphysics of the condensation process and in the nature of the condensation nuclei which are active for an appropriate process. The atmosphere is in a haze more than 90% of the time. It is observed at humidities from 30-40 to 75-80%, and more seldom to 98%. Foggy haze occurs if the humidity rises to 75-80%. The smooth transformation of haze into a foggy haze and the reverse occurs quickly when the dew point is reached and rather large particles begin serving as a condensation nuclei. Actual fog is a rare phenomenon.

42848 **APTIC NO. 66013**

Smokty, O. I.

LIGHT SCATTERING IN THE AEROSOL SPHERICAL ATMOSPHERE. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 325-328. 9 refs. (Aug.)*

A theoretical analysis of light scattering in the aerosol spherical atmosphere is presented. The analysis and the interpretation of the corresponding experimental data can be effectively performed based on various approximations only. The night horizon brightness of the real terrestrial atmosphere was calculated.

42849 **APTIC NO. 66007**

Volz, Frederic E.

TWILIGHTS BEFORE AND AFTER THE AGUNG ERUPTION. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 291. (Aug.)*

Twilight sky radiance due to strongly enhanced stratospheric dust was investigated after the eruption of the Agung volcano in March 1963. Most of the measurements were made in southern Germany from 1962 to 1967, and at Bedford, Mass. in the winter of 1967-1968 at 20 degrees elevation and in six spectral ranges from 377 to 970 nm. Twilight disturbance started 2 mo after the eruption, and was strongest in Jan. 1964, but never reached the normal level in the following years. Vertical dust profiles were derived and compare well with results of other optical and direct soundings, at least regarding the stratosphere. However, considerable multiple scattering is indicated in volcanic twilights at larger sun depressions.

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42850 **APTIC NO. 62445**

Anderson, J. G., J. J. Margitan, and F. Kaufman

GAS PHASE RECOMBINATION OF OH WITH NO AND NO2. *J. Chem. Phys., 60(8):3310-3317, April 15, 1974. 28 refs.*

The termolecular recombination of OH with nitric oxide and nitrogen dioxide is studied for M equals helium, argon, and nitrogen at pressures from 1-10 torr and temperatures from 230-450 K in a flow tube using resonance fluorescent detection of OH radicals. The reactions are in their low pressure, third-order limit. The rate constants for the NO reaction at 295 K are 3.3, 3.4, and 5.8 times 10 to the minus 31 cm to the 6th power/sec in the above order of M gases. For the NO2 reaction the corresponding values are 1.0, 1.0, and 2.3 times 10 to the minus 30th power, all with sigma equal to + or - 20% including estimates of systematic errors. Both recombinations show the expected temperature dependence, the Arrhenius activation energies being -1.7 kcal for NO and -1.8 kcal for NO2. These results are compared with all other published data and with RKKM unimolecular calculations. These studies are pertinent because the possibility of stratospheric pollution has raised questions regarding the chemical stability of the earth s ozone layer which controls climatic conditions and screens the surface from potentially harmful ultraviolet radiation. The recombination reactions studied are principally responsible for the conversion of the reactive oxides of nitrogen an hydrogen, which are able to destroy ozone catalytically in the stratosphere, to more stable products which do not react with ozone. (Author abstract modified)

42851 **APTIC NO. 66120**

Beck, M. T., L. Dozsa, and I. Szilassy

KINETICS AND MECHANISMS OF REDOX REACTIONS OF NITROGEN(III). *J. Indian Chem. Soc., 51(1):6-14, Jan. 1974. 31 refs.*

Various redox reactions of nitrogen(III) are considered in terms of their kinetics and mechanisms. Empirical rate laws are determined for several redox reactions of nitrite ion and nitrous acid; the rate appears independent of the concentration of the partner in a number of the reactions, while in other cases the order of the reactant is one or somewhere between zero and one. A mechanism is proposed for all three cases. Reactions of coordinatively bound nitrogen(III) are also investigated, with the reactivity of the coordinated N(III) species being influenced by the basic form of the coordinated ligand, the donor atom, and properties of the complex core. Ammonia, molecular nitrogen, nitric oxide, and nitrous oxide are cited as the gaseous products evolved by heating the precipitate obtained from a reaction mixture of nitrosyl pentacyano ferrate(II) and ammonia.

42852 **APTIC NO. 66521**

Bickelhaupt, R. E.

INFLUENCE OF FLY ASH COMPOSITIONAL FACTORS ON ELECTRICAL VOLUME RESISTIVITY (FINAL REPORT). *Southern Research Inst., Birmingham, Ala., Environmental Protection Agency Contract 68-02-0284, Program Element 1AB012, Rept. EPA-650/2-74-074, ROAP 21ADJ-029, SORI-EAS-74-247 2938-F, 49p., July 1974. 16 refs.*

Twenty eight fly ash samples were characterized, chemically analyzed, and fabricated into sintered disc resistivity specimens. The ashes represent a broad spectrum of ash compositions produced by burning coal in commercial power station boilers. Resistivity and transference experiments were performed. The volume conduction mechanism for fly ash in ionic and the charge carriers are the alkali metal ions, principally sodium. Increasing iron concentration caused a decrease in resistivity for a given level of Na and lithium. No evidence of biased data or electronic conduction was found. The iron affected the structure of the predominant glassy phase of the ash thereby inducing the participation of a greater percentage of the available alkali metal carrier ions. Empirical equations were developed to predict the volume resistivity of fly ash as a function of ash chemistry, temperature, and porosity. (Author abstract modified)

42853 **APTIC NO. 66099**

Bowen, J. Harry and Cheng K. Cheng

REGENERATION OF SULFATED ALKALIZED ALUMINA. *Environ. Sci. Technol., 8(8):747-751, Aug. 1974. 8 refs.*

The regeneration of sulfated alkalized alumina was investigated using hydrogen as the reducing agent. The alkalized alumina process for removing sulfur dioxide from flue gases depends on the effective regeneration of the sulfated alumina. The chemical steps of the regeneration are discussed, and some apparent energies of activation calculated. The rate-limiting step is the final stage regeneration, the hydrolysis of sodium sulfide. At the temperature studied, this step did not proceed rapidly enough to make use of water generated by the earlier steps before the water had been carried away by the hydrogen. Regeneration was completed only by adding water to the feed stream. (Author abstract modified)

42854 **APTIC NO. 66371**

Braun, Walter, Michael J. Kurylo, Andrew Kaldor, and Richard P. Wayne

NO2 CHEMILUMINESCENCE PRODUCED IN THE REACTION OF VIBRATIONALLY EXCITED O3 WITH NO. *J. Chem. Phys., 61(2):461-464, July 15, 1974. 10 refs.*

Experiments are performed in which vibrationally excited ozone, produced by carbon dioxide laser radiation, reacts significantly faster with nitric oxide than does thermal O3. The emission spectrum of the laser enhanced chemiluminescence from the reaction is measured from 520-810 nm, with the lowest lying state being identified as the primary source of nitrogen dioxide emission in the reaction between NO and O3. One quantum of vibrational excitation in the reactant O3 appears to introduce one quantum of vibrational energy in the product NO2. The rate enhancement of the reaction channel producing NO2 as a result of the vibrational excitation of O3 is 5.6 plus or minus 1.0. Thus, only about 50% of the available vibrational energy is used to enhance the reaction. (Author abstract modified)

42855 **APTIC NO. 66237**

Burton, W. B. and G. E. Pollard

RATE OF PHOTOCHEMICAL ISOMERIZATION OF ENDRIN IN SUNLIGHT. *Bull. Environ. Contamination Toxicol., 12(1):113-116, July 1974. 6 refs.*

The rate of photoconversion of endrin in the solid state to its isomerides on exposure to natural sunlight was investigated. The photochemical isomerization is more specific than either the chemical or thermal isomerization. It proceeds with the formation of primarily 1,8-exo-9,10,11,11-hexachloropentacyclo (6.2.1.1 superscript 3,6. 0 superscript 2,7. 0 superscript 4,10) dodecan-5-one (II), plus minor amounts of other compounds. A mechanism was postulated for the formation of II from endrin via an intermediate formed by the shift of two bonds. The disappearance of endrin and the conversion to the pentacyclic ketone (II) was more rapid in June than in October as would be expected in a brighter sun. Endrin was 50% isomerized to II in 7 plus or minus 2 days in an intense summer sun with complete conversion of the endrin in 17 plus or minus 2 days.

42856 **APTIC NO. 61773**

Calo, J. M.

HETEROMOLECULAR CLUSTERS OF H2O, SO2, CO2, CO, AND NO. *Nature (London), 248(5450):665-667, April 19, 1974. 19 refs.*

A supersonic molecular beam apparatus was used to generate heteromolecular clusters of water vapor, sulfur dioxide, carbon dioxide, carbon monoxide, and nitric oxide which were detected with a quadrupole mass spectrometer after mechanical beam chopping and subsequent phase-sensitive signal processing. The existence and identity of these mixed clusters formed during homogeneous nucleation processes in an isentropic expansion from the gas phase. Clathrate structures of water molecules around foreign gas molecules, particularly those found as trace contaminants in the atmosphere, may be important in aerosol physics. Sample mass spectra are given for the species observed to indicate the relative magnitudes of the ion signals.

42857 **APTIC NO. 66140**

Censor, D. and Z. Levin

ELECTROSTATIC INTERACTION OF AXISYMMETRIC LIQUID AND SOLID AEROSOLS. *Atmos. Environ., 8(9):905-914, Sept. 1974. 5 refs.*

The electrostatic interaction of axisymmetric liquid and solid aerosols, including the electrical forces and charges separated, was studied theoretically and using computed examples. Results were computed using the methods of moments. Explicit results were derived for charge separation and electrical forces in systems of deformed liquid particles and in systems of elongated solid aerosols (needles). The method was general enough to be applied to other systems of more complicated geometry. The following specific examples are discussed: charge separation during interaction of two and three liquid drops in the presence of a uniform electric field; charge separation during interaction of two elongated particles; and electrical forces between a sphere and a needle. The method of moments was handily used for determination of electrical forces, charges, and capacitances of arbitrary axisymmetric particles. The assumption that liquid particles remain spherical during their interaction may lead to errors of up to an order of magnitude in the computations of the electrical parameters. (Author abstract modified)

42858 **APTIC NO. 66175**

Davis, D. D., J. Prusaczyk, M. Dwyer, and P. Kim

A STOP-FLOW TIME-OF-FLIGHT MASS SPECTROMETRY KINETICS STUDY. REACTION OF OZONE WITH NITROGEN DIOXIDE AND SULFUR DIOXIDE. *J. Phys. Chem., 78(18):1775-1779, Aug. 29, 1974. 11 refs.*

Rate constants for the reaction of ozone with nitrogen dioxide were determined over the temperature range of 260-343 K by stop-flow time-of-flight mass spectrometry. All measurements were carried out using nitrogen dioxide in large excess over ozone, 10 to 1 or greater. Over the indicated temperature range, the data could be fit to the simple Arrhenius expression kl equals (9.01 + or - 0.81) times 10 to the -14th power exp(-4824 + or - 230 cal/mol/RT). Units are cu cm/molecule/sec. A more limited investigation of the analogous reaction between ozone and sulfur dioxide indicated that this reaction was extremely slow, having a k value less than or equal to 10 to the -22nd power cu cm/molecule/sec at 300 K. (Author abstract)

42859 **APTIC NO. 66195**

Dobbs, C. G.

FLUORIDE AND THE ENVIRONMENT. *Fluoride, 7(3):123-135, July 1974. 21 refs. (Presented at thy Conference of International Society for Fluoride Research, 5th Annual, Oxford (England), April 8-10, 1973.)*

The extent and measurement of pollution by industrial and natural fluorides are discussed. The total extent of the pollution of air, water, and food by fluorides is unknown and the estimated emissions are expected to double between 1971 and 1980. Sensitive plants, such as varieties of gladiolus, can be useful indicators for airborne fluorides. The monitoring of fluoride in Great Britain is limited to areas around known sources, whereas smoke and sulfur dioxide are monitored at a wide range of sites. This limits knowledge of the extent of long distance fluoride pollution and fluoride s possible additive and synergistic effects with SO2 and other pollutants. Lichens are often indicative of pollution levels. At their inner limit of survival, lichens can withstand only 20-48 ppm fluoride, compared to trees which can have 1140-1830 ppm. In most cases fluoride pollution is so mixed with SO2 and other pollutants, it is impossible to distinguish fluoride s effects.

42860 **APTIC NO. 66534**

Hubley, John H., John R. Mitton, and John F. Wilkinson

THE OXIDATION OF CARBON MONOXIDE BY METHANE-OXIDIZING BACTERIA. *Arch. Microbiol., vol. 95:365-368, 1974. 11 refs.*

Experiments involving the use of radiocarbon-labeled carbon monoxide and washed cell suspensions of Methylomonas albus and Methylosinus trichosporium indicate that these two methane- oxidizing bacteria are able to oxidize CO to carbon dioxide. Oxidation of CO to CO2 is demonstrated by respiration studies and CO2 evolution data, and the formation radiocarbon-labeled CO2 from radiocarbon-labeled CO argues against the hypothesis that CO may be merely stimulating endogenous CO2 production. Rates of CO2 production are doubled in the presence of CO to give CO2 production rates of the order of 5 nmoles CO2/min/mg dry weight of the cells.

42861 **APTIC NO. 62864**

Ivanyuk, Y. G. and A. I. Kobzar

THE USE OF CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF THE THERMAL DESTRUCTION PRODUCTS OF POLYSTYRENE FOAM. *(Primeneniye khromatograficheskogo metoda dlya opredeleniya produktov termicheskoy destruktsii penopolistirola). Text in Russian. Gigiena i Sanit., no. 2:63-65, 1974. 5 refs.*

Gas-chromatographic methods for the qualitative and quantitative determination of the pyrolysis products of polystyrene foam, and actual determinations of the pyrolysates of polystyrene foams with densities of 0.034; 0.024; 0.027, and 0.034 g/cu cm are described. The pyrolysis products of polystyrene foams are detected by the argon-ionization detector following separation of the gaseous products on silica gel, and separation of the liquid hydrocarbons on polyethylene glycoladipinate-coated spherochrome. Hydrogen, carbon monoxide, ethene, methane, acetylene, benzene, styrene, toluene, and soot were the major products of the pyrolysis of the polystyrene foams at 1500 C. The yields of these pyrolysis products varied greatly as a function of the type (density) of the polystyrene foam.

42862 **APTIC NO. 66508**

Jaffe, R. J., F. C. Smith, Jr., and K. W. Last

STUDY OF FACTORS AFFECTING REACTIONS IN ENVIRONMENTAL CHAMBERS FINAL REPORT ON PHASE II. *Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif., Coordinating Research Council, Inc. and Environmental Protection Agency Contract 68-02-0287, Proj. 21AKC-34, Program Element 1AA008, Rept. EPA-650/3-74-004-a, LMSC-D401598, 86p., April 1974. 13 refs.*

The effects of materials, spectrum, surface/volume ratio (S/V), and cleaning technique on the photochemical reactions observed in a smog chamber were investigated. A unique chamber and lighting system permitted independent variation in chamber materials and light conditions. All photochemical runs were at kd of 0.3/min. The propylene (3 ppm)/nitrogen oxides (1.5 ppm) reaction system was used, at 95 F and 25% relative humidity. Initial nitrogen dioxide was 10% NOx. Chamber background was less than 0.1 ppm carbon. The time to NO2 maximum is shortest for stainless steel, followed by aluminum, Pyrex, and Teflon. The cutoff spectrum strikingly lowers reaction rates compared to the full spectrum. Surface/volume ratio measurably affects reactions. The cleaning technique does not cause large changes. (Author abstract modified)

42863 **APTIC NO. 66564**

Katz, Ulrich and Warren C. Kocmond

A PRELIMINARY INVESTIGATION OF THE INTERACTION BETWEEN PHOTOCHEMICAL AEROSOLS AND FOG. *Calspan Corp., Buffalo, N. Y., Navy Contract NOOO14-71-C-0291, Rept. VC-3080-M-2, 24p., Jan. 1974. 9 refs.*

NTIS, DDC: AD-773642

Preliminary experiments were performed in a 600 cu m environmental smog chamber to study the influence of relative humidity and the presence of certain aerosols on the formation of photochemical aerosols and cloud condensation nuclei. The tests suggested that in the case of sulfur dioxide as the principal reactant, the formation of condensation nuclei during irradiation and subsequent fog formation was not different for high or low humidity cases. The sulfuric acid nuclei which were formed, however, enlarged at high humidity and contributed to the formation of smog. Sodium chloride or natural aerosol at high humidity caused a strong depletion of SO2 but did not influence the photochemical aerosol formation. A propylene-nitrogen dioxide system at low humidity produced a much denser aerosol than at high humidity, with the same trend being shown by fog densities. The presence of NaCl particles in the propyelene-NO2 system at high humidity did not exert any influence on the photochemical aerosol production nor on the concentration of the gaseous reactants. (Author abstract modified)

42864 **APTIC NO. 66101**

Moore, Howard

ISOTOPIC MEASUREMENT OF ATMOSPHERIC NITROGEN COMPOUNDS. *Tellus (Uppsala), 26(1-2):169-174, 1974. 17 refs.*

Preliminary results on nitrogen-15/N-14 ratios in a variety of atmospheric N compounds are presented. Nitrogen compounds are of great importance in urban pollution problems and in relation to the stratospheric ozone budget. Techniques are described to isolate various N compounds and convert them to N2 for isotopic determination. Specific compounds include nitrous oxide, nitrogen dioxide, particulate ammonium and nitrate ions, and ammonium and nitrate ions in precipitation. Nitrogen isotope ratios are determined using a 15 cm Nuclide Associates double beam isotope ratio mass spectrometer.

42865 **APTIC NO. 66100**

Nash, T.

NITROUS ACID IN THE ATMOSPHERE AND LABORATORY EXPERIMENTS ON ITS PHOTOLYSIS. *Tellus (Uppsala), 26(1-2):175-179, 1974. 5 refs.*

Low concentrations of nitrous acid in air were estimated by a differential absorption method. Over a 3-month period, atmospheric concentrations at one location in southern England varied between 0.4 and 11 pb while those of nitrogen dioxide varied between 4 and 21 ppb. The highest proportion of acid was found in air which had passed over the industrial regions of western Europe. In the laboratory, concentrations of about 1 ppm of nitrous acid with less than 0.03 ppm of NO2 were produced by blowing air over a shallow layer of very dilute acidified nitrite solution. Exposure of the vapor to the light from a pyrex-shielded mercury arc caused decomposition with production of NO2. This decomposition was apparently prevented by some olefins. Nitrous acid was not a source of hydroxyl radicals in the atmosphere. (Author abstract modified)

42866 **APTIC NO. 66115**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. IOWA AND MISSOURI; APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(166):30834-30835, Aug. 26, 1974.*

Approved and disapproved revised compliance schedules for Iowa and Missouri state implementation plans are listed. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the Federally approved state implementation plan. This date is indicated in a table under the heading final compliance date. The reasons for disapproval of some of the revised schedules are given.

42867 **APTIC NO. 62405**

Reed, Joseph and Richard Eisenberg

NITRIC OXIDE REDUCTION COUPLED WITH CARBON MONOXIDE OXIDATION IN THE PRESENCE OF SOLUBLE METAL CATALYSTS. *Science, 184(4136):568-570, May 3, 1974. 12 refs.*

Oxides of nitrogen comprise an important environmental problem, and this has led to increased study of the reactions of the parent member of this series, nitric oxide. The decomposition of NO was studied in a reaction of NO reduction and carbon monoxide oxidation proceeding at ambient temperature and atmospheric pressure in the presence of soluble metal complexes to yield nitrous oxide and carbon dioxide. This coupled reaction is catalytic in the metal complex. The catalyst solutions were rhodium chloride (RhC13.xH2O) in ethanol and Ru (NO)2(P(C6H5)3)2 in benzene. The reaction was followed by gas chromatography and by the decrease in pressure of the system. The reaction proceeded to 47% conversion of the reactants after 63 hr. (Author abstract modified)

42868 **APTIC NO. 66136**

Schultz, H. D., C. J. Vesely, and D. W. Langer

ELECTRON-BINDING ENERGIES FOR SILICON MINERALS OCCURRING IN RESPIRABLE COAL DUST. *Appl. Spectry., 28(4):374-375, 1974. 1 ref.*

Results of electron binding energy measurements using an electron emission spectrometer on coal and respirable coal dust samples are presented for various silicon minerals occurring in coal dust. The data indicate a tendency for the silicon atoms which are surrounded by electron-withdrawing groups to have a higher electron-binding energy. Measurements on a Pennsylvania coal sample show signals at 105.5, 104.1, and 107.4 eV, corresponding to alpha-quartz, cristobalite, and kaolinite, respectively. Alpha-quartz is the principal contributor to coal miner s silicosis, and preliminary data indicate that the electron emission spectroscopic method has the potential to identify alpha-quartz from silicates such as kaolinite, a common constituent of coal dust.

42869 **APTIC NO. 66537**

Shahidi, I. K., J. C. Trebellas, and J. A. Vona

MULTIFUNCTIONAL MONOMERS FOR UV CURE. *Paint Varnish Prod., 64(8):32-36, Aug. 1974. 21 refs.*

The chemistry of ultraviolet curing with multifunctional monomers is reviewed in relation to the process s application to surface coating and the manufacture of curable inks, with particular reference to the resultant savings in fuel costs and reduction in air pollution as compared with thermal processes. The curing mechanism is a free radical reaction generated by radiation energy rather than thermal energy. The three essential components of an ultraviolet curing process are: an ultraviolet reactive polymer that provides the bulk of the desired properties, a diluent system that is composed of multifunctional acrylate esters (and, at times, monofunctional acrylic esters), and the photoinitiator system. Data on composition and physical properties are given for various Celanese multifunctional acrylates and for ultraviolet cure formulations based on acrylated polyesters, acrylated alkyds, and acrylated epoxies.

42870 **APTIC NO. 66205**

Shaw, H.

THE EFFECTS OF WATER, PRESSURE, AND EQUIVALENCE RATIO ON NITRIC OXIDE PRODUCTION IN GAS TURBINES. *J. Eng. Power, 96(3):240-246, July 1974. 21 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine Division, Annual Meeting, Winter, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/GT/1.)*

A semiempirical technique for predicting the nitrogen oxides emission index from the combustion of distillate type fuels with air was developed to help evaluate combustion modification procedures for lowering NOx emissions. Fluid dynamic effects were neglected, and the technique is based on chemical kinetics founded on the modified Zeldovich chain mechanisms for nitric oxide production from hot air and Fenimore s data for prompt NOx. Hand calculation is possible if the NOx equilibrium value is known at the temperature and pressure of interest. Excellent agreement was obtained with experimental results from gas turbines. The apparent time required to produce NOx was the only adjustable parameter used to fit the data. A large volume of data from aircraft gas turbines was correlated by assuming an apparent residence time of 0.5 millisec. The effectiveness of water addition in minimizing NOx emissions was predicted for a model of an industrial gas turbine using 2 millisec residence time. The calculations predict that the maximum NOx emission index shifts from stoichiometric combustion to lean combustion as air preheat temperature is lowered. This prediction was not confirmed experimentally. (Author abstract modified)

42871 **APTIC NO. 66408**

Stein, Werner Alexander

CALCULATION OF SIMULTANEOUS EQUILIBRIA FOR HOMOGENEOUS OR HETEROGENEOUS REACTIONS WITH IDEAL OR REAL GASES. *(Berechnung von Simultangleichgewichten fuer homogene oder heterogene Reaktionen mit idealen oder realen Gasen). Text in German. Chemiker-Ztg. (Heidelberg), 98(9):446-456, 1974. 19 refs.*

A calculation of the thermodynamic equilibrium of simultaneous reactions is necessary for combustion processes in engines, gas turbines, or rockets, for gasification processes, and for all chemical processes in the chemical industry. A universal computer program for the calculation of the equilibrium concentration and thermodynamic properties of a chemically reactive mixture of gases and condensed material is presented. The methane-steam reaction and water dissociation are given as examples.

42872 **APTIC NO. 66165**

Sugioka, Masatoshi and Kazuo Aomura

STUDIES OF THE CRACKING REACTIVITY OF ORGANIC SULFUR COMPOUNDS (PART 3) -- HYDROCRACKING REACTIVITY OF ORGANIC SULFUR COMPOUNDS ON DESULFURIZATION CATALYST--. *(Yuki io kagobutsu no bunkai hannosei ni kansuru kenkyu (sono 3)). Text in Japanese. Hokkaido Daigaku Kogakubu Kenkyu Hokoku (Bull. Fac. Eng., Hokkaido Univ., no. 71:207-215, June 1974. 4 refs.*

The hydrocracking reactivity of various organic sulfur compounds on desulfurization catalysts was investigated with a pulse reactor. The hydrocracking reactivity was similar for all compounds on the two catalysts tested, cobalt-molybdenum-aluminum and nickel sulfide-SA. Linear relationships were observed between the logarithms of the apparent first order rate constants in the hydrocracking of the S compounds on the desulfurization catalysts and the bond dissociation energy of the carbon-S bond in the molecules. The hydrocracking reactivity of organic S compounds in petroleum on desulfurization catalysts can be expressed by the bond dissociation energy of the C-S bond of organic S compounds.

42873 **APTIC NO. 64872**

Velzen, D. van, H. J. Flamm, H. Langenkamp, and A. Casile

MOTION OF SOLIDS IN SPOUTED BEDS. *Can. J. Chem. Eng., 52(2):156-161, April 1974. 8 refs. (Presented at the American Institute of Chemical Engineers-Canadian Society of Chemical Engineers, Joint Conference, 4th, International Symposium on Spouted Beds, Vancouver, British Columbia, Sept. 9-12, 1973.)*

Solids movement in a spouted bed was investigated by means of a radioactively marked particle technique using a scintillation counter as a detector. The average particle velocity in the spout depended on the gas flow rate, the gas inlet geometry, axial elevation, bed height, and column diameter. The solids circulation rate was proportional to the gas flow rate and was a function of column and gas inlet geometry, density of fluidizing gas, and particle diameter. Empirical correlations for both the particle velocity in the spout and the solids circulation rate as a function of axial elevation are presented. (Author abstract)

42874 **APTIC NO. 62427**

Warneck, Peter

ATMOSPHERIC TRACE CONSTITUENTS AS INDICATORS FOR OH CONCENTRATIONS IN THE ATMOSPHERE. *Ber. BunsenGes. Physik. Chem., 78(2):192-193, 1974. 9 refs.*

The hydroxyl radical is responsible for many oxidation processes in the lower atmosphere. Since photochemical modeling estimates of the OH densities give values beyond the capability of direct detection by presently available instrumentation, more indirect methods must be used to gain information about the densities of OH radicals. For the lower stratosphere, useful trace gases are methane, carbon monoxide, and hydrogen; these participate in the oxidation cycle of methane. Only methane is discussed, because it can provide a simple example for the procedure that must be used to deduce from the CH4 concentration-altitude profile, the effective OH density. In the troposphere, a sensitive upper limit indicator for OH is its oxidation of nitrogen dioxide and the resulting precipitation of nitrate. This process is discussed as a second example. The calculated OH density for 14.5 km was 4 times 10 to the 6th molecules/cu m, about five times higher than the value estimated from model calculations. In the troposphere, the density was 2.5 times 10 to the 5th molecules/cu cm, smaller by a factor of 10 than the estimated value.

42875 **APTIC NO. 66463**

Watson, R. T.

CHEMICAL KINETICS DATA SURVEY. VIII. RATE CONSTANTS OF CLOX OF ATMOSPHERIC INTEREST INTERIM REPORT. *California Univ., Berkeley, Calif., Dept. of Chemistry, Proj. 3160409 National Bureau of Standards Interim Rept. 74-516, 51p., June 1974. 91 refs.*

Quantitative data on reactions of chlorine atoms and the chlorine oxides are compiled, with preferred values for rate constants being given where possible. Optical absorption cross sections are given for the species thay may photolyze in the atmosphere. Experimental techniques used to obtain the kinetic data include: the calorimetric probe, emission spectroscopy, ultraviolet spectrophotometry, mass spectrometry, resonance fluorescence, resonance absorption, electron paramagnetic resonance spectrometry, and infrared spectroscopy. The data are considered necessary in order to perform model calculations which would establish the perturbation upon the stratospheric ozone column concentration due to the injection of chlorine containing species. Most of the rate is obtained at 298 K, and consequently estimates must be made as to the temperature dependence of the rate constants. (Author abstract modified)

42876 **APTIC NO. 63243**

Yalamov, Y. I., V. M. Aladzhyan, and V. S. Galoyan

THE EFFECT OF THERMODIFFUSION ON THE THERMAL PRECIPITATION RATE OF LARGE VOLATILE AEROSOL PARTICLES. *(O vliyanii termodiffuzii na skorost termopretsipitatsii krupnykh letuchikh aerozol nykh chastits.) Text in Russian. Zh. Fiz. Khim., 48(2):488, 1974. 2 refs.*

The theory of thermophoresis of relatively large evaporating or growing aerosol droplets and of binary gaseous mixtures with inhomogeneous temperature is proposed for the case of approximately identical relative gas molecule concentration and density. Hydrodynamic, diffusion, and thermal conductivity equations with boundary conditions accounting for isothermal, thermal, diffusional, and thermodiffusional slips of the mixture along the particle surface, and for the temperature and concentration jumps in Knudsen s layer are used for the description of the behavior of the gaseous mixture around the droplet particle. The resulting formula describing the rate of thermophoresis contains an additional component that is proportional to the coefficient of thermodiffusional slip.

42877 **APTIC NO. 62453**

Yokohata, Akira, Kazuto Takimoto, and Satoru Tsuda

FORMATION OF RADICALS BY LIGHT IRRADIATION TO A GAMMA RAYS- IRRADIATED METALLIC OXIDE-HYDROGEN SULFIDE SYSTEM. *(Gamma-sen shosha shita kinzoku sankabutsu-ryuka suiso kei no koshosha ni yoru rajikaru seisei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 675, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, April 1-4, 1974, Paper 1G11.)*

The reaction mechanism of hydrogen sulfide decomposition on the surface of a solid material was studied by light irradiation and causing electron movement in toxic gas. As absorbent, silica gel, 53%-silica alumina, and molecular sieve were used. They were heated at 300 C for three hours in a vacuum, and H2S was adsorbed through a breakable seal. Gamma rays were delivered at 77 K, and then an ultra high voltage mercury lamp and UV-39 glass filter combination was used for irradiation. The electron spin resonance spectrum was measured. The results of gamma ray irradiation and light irradiation are presented in graphs. In all cases, radical formation was noted.

1973

42878 **APTIC NO. 66553**

Hamelin, Claude and Young S. Chung

RESISTANCE TO OZONE OF ESCHERICHIA COLI. I. COMPARATIVE STUDY OF THE B AND B/R STRAINS. *(Resistance a l ozone chez Escherichia coli. I. Etude comparative de differentes souches B et B/rl). Text in French. Rev. Can. Biol., 32(3):169-176, Sept. 1973. 4 refs.*

The ozone-resistance of different strains of Escherichia coli was studied in a 2.5-hour experiment. At an initial cell concentration of 8,000,000-12,000,000 suspended in water, the lethality increased as a function of the ozone concentration ranging from 5 to 50 ppm. Also, the lethality was higher in more dilute suspensions. The B/r type strains were more resistant to ozone than were the type B strains.

42879 **APTIC NO. 66547**

Hertl, W. and R. F. Farrauto

MECHANISM OF CARBON MONOXIDE AND HYDROCARBON OXIDATION ON COPPER CHROMITE. *J. Catalysis, 29(2):352-360, 1973. 15 refs.*

The oxidation of carbon monoxide and hydrocarbons on a copper chromite catalyst was investigated with infrared spectroscopic, gravimetric, and kinetic techniques. Carbon monoxide adsorbs concurrently on exposed lattice copper atoms to form Cu single bond carbon triple bond and oxygen and on lattice O2 atoms to form chromium single bond oxygen double carbon double bonded to two oxygen atoms. The source of the O2 required to form the unidentate carbonate groups is the catalyst, not the gas phase. In the absence of air, the oxidation reaction via the carbonyl group becomes important at temperatures above 80 C, and that via the decomposition of the carbonate groups above 200 C. When hydrocarbons adsorb above 130 C, they are transformed to unidentate carbonate groups and liberate water vapor. As with CO, above 200 C these carbonate groups decompose to give gaseous carbon dioxide. For the carbonyl decomposition path, the reaction is first order in CO, and pseudo-zero order in O2. The amount of CO2 produced by the oxidation reaction does not inhibit the rate. (Author abstract modified)

42880 **APTIC NO. 66096**

Ivanov, K. I., R. A. Lipshtein, and V. E. Chmovzh

THE EFFECT OF METALLIC ADDITIVES ON THE SO3 CONCENTRATION IN COMBUSTION PRODUCTS OF HIGH-SULPHUR LIQUID FUELS. *Thermal Eng. (English translation from Russian of: Teploenergetika), 20(10):125-128, Oct. 1973. 7 refs.*

The effect of metallic additives on the sulfur trioxide concentration in combustion products of high sulfur liquid fuels was investigated. The interaction between the sulfur dioxide and atomic oxygen formed in the flame is the main source of SO3 formation. The effectiveness of additives can be distorted by the temperature regime of the furnace, the excess air, and the leaking air. Naphthenates of sodium, potassium, magnesium, zinc, aluminum, barium, cobalt, manganese, and lead reduce the SO3 content of the combustion products. The most effective naphthenates are Mn and Pb which inhibit SO3 formation. Chromium naphthenate increases SO3 content. The addition of Mg, Zn, Al, Co, Mn, and Pb naphthenates to fuel in the test quantities is equivalent with respect to reducing SO3 to a reduction in excess air to alpha equals 1.01 to 1.03. (Author summary modified)

42881 **APTIC NO. 66173**

Iverach, David, Nikolas Y. Kirov, and Brian S. Haynes

THE FORMATION OF NITRIC OXIDE IN FUEL-RICH FLAMES. *Combust. Sci. Technol., 8(4):159-164, 1973. 15 refs.*

The apparent discrepancies of nitric oxide formation rates in fuel-rich flames are reviewed in the light of recently published work. The Zeldovich mechanism alone appears to be insufficient to account for observed behavior under conditions in which hydrocarbon species are present, and a mechanism involving such species seems plausible. Experimental results of this conclusion are presented in a form suitable for kinetic analysis. The experiment was conducted on a flat-flame Meker-type burner for a variety of fuel-rich flames. A mechanism involving the generation of N-atoms (or an N-containing species) by the reaction of molecular nitrogen with hydrogen fragments and their subsequent reaction with hydroxyl seemed a plausible explanation of the discrepancy between the Zeldovich mechanism and the observed nitric oxide formation under fuel-rich conditions in hydrocarbon flames. The observations that the Zeldovich mechanism is applicable in carbon monoxide/hydrogen flames of all stoichiometries, where high concentrations of hydrocarbon species have not been detected, lends further support to this interpretation.

42882 **APTIC NO. 66210**

Kajikawa, Motoharu, Nobuko Suzuki, Ryokuero Suzue, and Shoji Kawada

DETECTION OF HEAVY METAL TOXICITY BY CELL CULTURE METHOD (I). *(Kakushu jikinzoku ga seitai ni oyobosu sayo no saibo Eiyogakuteki jinsoku kensa-jo (1)). Text in Japanese. Kokuritsu Eiyo Kenkyusho Hokoku (Annu. Rep. Natl. Inst. Nutrition), no. 22:227-232, 1973. 13 refs.*

The use of the cell culture method to detect heavy metal toxicity was investigated and compared to an animal test. The choice of cell strain was important in the cell culture. Sodium, calcium, potassium, and magnesium were harmless to cell growth, while cadmium, mercury, chromium, and arsenic inhibited cell growth. In the animal test, metals could be classified toxicologically into either harmless (Na, Ca, K, and Mg) or toxic (Cd, Hg, Cr, and arsenic). Results from both methods were the same, but the cell culture saved cost, time, and labor.

42883 **APTIC NO. 65754**

Kocmond, W. C., D. B. Kittelson, J. Y. Yang, and K. L. Demerjian

DETERMINATION OF THE FORMATION MECHANISMS AND COMPOSITION OF PHOTOCHEMICAL AEROSOLS. *Calspan Corp., Buffalo, N. Y., Environmental Protection Agency Contract 68-02-0557, Program Element 1A1008, ROAP 21AKB-02, Rept. EPA-650/3-73-002, Calspan Rept. NA5365-M-1, 109p., Dec. 1973. 11 refs.*

NTIS: PB 230987

Laboratory studies were conducted of the formation mechanisms and growth processes of photochemical aerosols. Experiments were conducted in 20,800 cu ft, 600 cu ft, and 90 cu ft smog chambers. Emphasis was placed on examining aerosol behavior in the relatively simple sulfur dioxide/clean air system. A limited number of experiments were also performed using the propylene-nitrogen oxide systems. Substantial effort was directed toward upgrading and testing the 20,800 cu ft smog chamber and its support facilities. Improvements were made and tests were performed to evaluate wall effects and to establish overall chamber background reactivity. Additional modifications to thhe present lighting system were made to provide a five-fold intensity increase. Greater control of chamber conditions was available in the 600 cu ft chamber. The effects of relative humidity on aerosol formation, as well as the influence of bag size on particle growth and decay were also studied. The overall utility of the large chamber was convincingly demonstrated. Coagulation experiments showed effective working times of 4-6 hr in the 600 cu ft chamber and about 2 hr in the 90 cu ft chamber. Aerosol formation was an extremely sensitive indicator of the chemical reactions occurring in the smog chambers. In fact, the reaction threshold as indicated by the onset of Aitken nuclei formation in SO2 photooxidation could not be detected by present gas analysis instrumentation. The fraction of SO2 involved in the reaction was extremely small, even though particle concentrations often exceeded 10 to the 6th power/cu cm. Aerosol formation was a sensitive indicator of impurities in the chamber at concentrations far below gas analysis detection limits. The SO2 photooxidation test system provided data generally consistent with the accepted understanding of the reaction system. A relatively simple aerosol formation model for SO2 photooxidation is presented. (Author summary modified)

42884 **APTIC NO. 66220**

Naumenko, Y. K. and A. P. Prishivalko

INFLUENCE OF WATER-AEROSOL MICROSTRUCTURE ON THE SCATTERING ENVELOPE, ITS ASYMMETRY, AND THE DEGREE OF POLARIZATION OF THE SCATTERED LIGHT. *Bull. Acad. Sci. (USSR) Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk. SSSR, Fiz. Atmosfery i Okeana), 9(7):719-728, 1973. 16 refs.*

A mathematical analysis is presented on scattering envelopes and the angle dependence of the degree of polarization light scattered by water aerosols with various microstructures which are described by a gamma particle-size distribution. Determinations are made for the particle size and scattering angle ranges in which the envelope and the degree of polarization are most sensitive to the microstructural parameters of the atmosphere, and the asymmetry of the envelope is examined as a function of the microstructural parameters of the scattering medium, with the relationship of envelope shape to scattering coefficient also being studied. Media with an average diffraction parameter approximately equal to 4 are characterized by the greatest asymmetry of scattering; scattering coefficients are also largest for such media. (Author abstract modified)

42885 **APTIC NO. 66548**

Scanlon, John W. and Lee A. Segel

SOME EFFECTS OF SUSPENDED PARTICLES ON THE ONSET OF BENARD CONVECTION. *Phys. Fluids, 16(10):1573-1578, Oct. 1973. 14 refs.*

Because of interest in fluid-particle mixtures generally and columnar instability in particular, some of the continuum effects of particles on Benard stability were studied. The effects of particle mass and heat capacity on stability were studied; effects of particle buoyancy were neglected; and simplifications were made on the assumption that the particle volume was very small. Then instability was studied where the only effect of temperature was via a contribution to the force on the particles which was proportional to the temperature gradient. In the simplified case considered, particles decreased the critical temperature difference for the onset of convection by increasing the heat capacity of the fluid. A proof of exchange of stabilities showed that there was no effect of particle drag when instability set in, although the rate at which unstable perturbations grew was affected by this factor. Thermal force alone could, in principle, give rise to instability in layers heated from above or below. The results are discussed with reference to experiments in gas-particle mixtures which show columnar instabilities at unusually low temperature differences. (Author abstract modified)

42886 **APTIC NO. 66473**

Tuteja, A. D. and H. K. Newhall

A STUDY OF NITRIC OXIDE FORMATION IN DIFFUSION FLAMES. *Preprint, Combustion Inst., Pittsburgh, Pa., 57p., 1973. 17 refs. (Presented at the Combustion Institute, Central States Section., Technical Meeting, March 27-28, 1973.)*

The processes leading to formation of nitric oxide in a coaxial, methane-air diffusion flame burner are described. Radial concentration profiles for NO were determined experimentally with this burner at several fixed axial locations. In addition, concomitant temperature and concentration profiles for carbon monoxide, carbon dioxide, oxygen, nitrogen, and methane were determined, thus permitting NO profiles to be related to detailed flame structure. Nitric oxide concentration profiles were predicted theoretically using the Zeldovich NO formation mechanism in conjunction with appropriate conservation equations associated with the flame flow field. Nitric oxide was formed in diffusion flames in the narrow region of highest temperature and diffused toward both the fuel-rich and oxygen-rich regions. Detailed NO concentration profiles were predicted using the Zeldovich mechanism in conjunction with an assumed equilibrium distribution of atomic and molecular species (with the exception of NO). The major problem with such an analysis was analytical characterization of detailed flame structure. (Author abstract modified)

42887 **APTIC NO. 64610**

Westwater, E. R. and A. Cohen

APPLICATION OF BACKUS-GILBERT INVERSION TECHNIQUE TO DETERMINATION OF AEROSOL SIZE DISTRIBUTIONS FROM OPTICAL SCATTERING MEASUREMENTS. *Appl. Opt., 12(6):1340-1348, June 1973. 15 refs.*

The inversion technique of Backus-Gilbert is applied to the recovery of size distributions of spherical particles from multiwavelength scattering measurements. Spatial resolution inherent in a set of multiwavelength measurements is tudied as a function of number of measurements, measurement noise level, and radius. The technique is illustrated by considering a problem of recovering the size distribution whose range is 0.5-1.0 micron from measurements of 90 degrees scattering from spherical particles of known refractive index. Spatial resolutions of less than 55% of the total range for radii greater than 0.7 micron are obtained from 21 equally spaced measurements from 400-700 micron. The accuracies in estimating averages appropriate to these resolutions are about 10% with 1% measurement accuracy. Achievable spreads deteriorate rapidly for radii below 0.7 micron. The results indicate that the size distribution can be recovered at selected points without using a priori assumptions about the shape of the distribution.

42888 **APTIC NO. 62076**

Zotov, B. G., S. K. Voskresenskii, V. A. Zaitsev, and B. V. Gromov

FLUORINE DISTRIBUTION IN PHOSPHORIC ACID PRODUCTION. *Sov. Chem. Ind. (English translation from Russian of: Khim. Prom.), 5(10): 640-642, Oct. 1973. 6 refs.*

The distribution of fluorine in three processes for the production of phosphoric acid was investigated. The processes studied were the dihydrate, semihydrate, and anhydrite processes. The behavior of the F2 compounds and their distribution in thy phases differ, depending on the concentration of phosphoric acid in the reaction slurry and the temperature conditions of the process of sulfuric acid dissection of phosphates. The study made it possible to determine the stages of the process at which the extraction of F2 will be a maximum.

1972

42889 **APTIC NO. 66455**

Balgord, W. D., R. W. Strickland, and K. W. Wang

NOVEL CATALYSTS AND CATALYST SUPPORTS FOR THE CONVERSION OF NITRIC OXIDE. *AIChE Symp. Ser., 68(126):102-109, 1972. 12 refs.*

Highly active catalyst for the reduction of nitric oxide with carbon monoxide were prepared and evaluated in a laboratory. Nitric oxide conversions of 99% at 25 C were obtained under nearly dry conditions in feed mixture containing 1500 to 1700 ppm NO and 1.5-2.0% carbon monoxide at bed space velocity of 15,000/hr. Under moist conditions (feed containing up to 10% water) conversions of 98% were attained at 100 C. This compares favorably with observed NO conversion over several commercial copper chromite catalysts. Efficient catalysts can be prepared from compositions based on cobalt chromium, copper chromium, iron, nickel, and lanthanum carbonate, provided catalysts are properly matched with support. The most promising supports are a porous silica glass pretreated with ammonium hydrogen fluoride, a class of controlled pore silicas, metal felt, and metal foam. (Author summary modified)

42890 **APTIC NO. 66514**

Bartok, W., B. S. Engleman, R. Goldstein, and E. G. del Valle

BASIC KINETIC STUDIES AND MODELING OF NITROGEN OXIDE FORMATION IN COMBUSTION PROCESSES. *AIChE Symp. Ser., 68(126):30-38, 1972. 13 refs.*

Nitrogen oxides formation was investigated under intensely back-mixed combustion conditions. Data obtained in methane/air combustion in a jet stirred combustor indicate the strong depdendence of NOx formed on fuel/air mixture ratio. The peak concentrations occur at 90% stoichiometric air. Representative nitrogen compounds, such as ammonia, nitrogen dioxide, cyanogen, and monomethylamine deliberately added appear as NOx in the final combustion products. The equivalence depends on mixture ratio. A boiler oriented nitric oxide kinetic model was developed and illustrative model predictions are included. (Author abstract modified)

42891 **APTIC NO. 66453**

Biswas, Bimal K. and Robert H. Essenhigh

THE PROBLEM OF SMOKE FORMATION AND CONTROL. *AIChE Symp. Ser., 68(126):207-215, 1972. 27 refs.*

The formation and control of smoke by combustion were investigated. A stirred combustor designed to reduce or eliminate problems due to slow mixing was used. The kinetic constants of combustion are a second order reaction. A first or pseudo first-order reaction, proportional to the smoke concentration alone, is ruled out by the existence of an unstable interaction on a back plot of the appropriate Semenov/Vulis graph. Stable interactions are obtained for a second order reaction, with the rate proportional to the oxygen concentration was well as to the smoke concentration. The activation energy determined from the relevant Arrhenius plot is 16.5 kcal, which is typical of values frequently given for carbon monoxide combustion. This agrees with the common postulate that CO is the slow step in hydrocarbon combustion. (Author abstract modified)

42892 **APTIC NO. 66516**

Force, Edwin L. and Richard J. Ayen

CATALYTIC REDUCTION OF 50 TO 5000 PPM NITRIC OXIDE BY CARBON MONOXIDE. *AIChE Symp. Ser., 68(126):80-90, 1972. 34 refs.*

The kinetics of the copper chromite-catalyzed reaction between nitric oxide and carbon monoxide at NO concentrations and temperatures characteristic of automobile exhaust were determined. The excess of CO over NO in the exhaust suggests than an oxidation reduction reaction between these species should be examined as a means of removing them in a catalytic converter. The rate equation obtained scales up to CO concentrations as high as 1.2 mole%. The correspondence between the kinetic and confirmation runs reinforces the observation that CO2 does not affect the rate of NO reduction. The proposed rate equation is satisfactory from an empirical point of view. Two orders of magnitude of reactant concentrations and rates are correlated over a 260 C temperature range with an average relative deviation uncertain in the experimental measurements. There were variations observed during the kinetic runs: in a reducing atmosphere, the catalyst oxidation state is decreased and its activity for catalysis of NO reduction increases; in an oxidizing atmosphere, the catalyst oxidation state is increased and its activity for catalysis of NO reduction decreases.

42893 **APTIC NO. 66477**

Happel, John, Miguel A. Hnatow, Abraham Rodriguez, and Shoichi Oki

COMPLEX REACTION ANALYSIS ILLUSTRATED BY OXYGEN TRACER EXPERIMENTS IN SULFUR DIOXIDE OXIDATION. *AIChE Symp. Ser., 68(126):155-159, 1972. 8 refs.*

The use of isotopic tracers to study the kinetics and mechanism of complex catalytic reactions was theoretically investigated. Relationships developed on the basis of steady state conditions are combined with basic principles of thermodynamics and transition state theory. The methodology affords a new tool for interpretation of experimental data free from assumptions usually made in the development of Langmuir-Hinshelwood models. Experiments were conducted on the oxidation of sulfur dioxide over a vanadium based catalyst at 470 C in an all glass, essentially gradientless reactor. Oxygen chemisorption was always the slowest step, but reaction steps involving sulfur are significant in establishing the overall rate. (Author abstract modified)

42894 **APTIC NO. 66458**

Johnson, Mary Lynn M. and Robert H. Essenhigh

THE POTENTIAL OF INDUSTRIAL FURNACES FOR CO EMISSIONS. *AIChE Symp. Ser., 68(126):311-320, 1972. 30 refs.*

Gas analyses were made in the post-flame region up to 19 cm above a flat flame burner situated at the bottom of a 5 cm diameter chimney. The fuel was high purity propane and equivalence ratios ranged from 36% fuel rich to 30% air rich. The analyses showed only carbon dioxide close to equilibrium, up the chimney, in the fuel rich region. Hydrogen and carbon monoxide were below equilibrium through most of the fuel rich region, and oxygen and CO2 were respectively above and below equilibrium by one to two percentage points in the air rich region. At stoichiometric and air rich conditions, the CO concentrations were as much as a factor of 10 greater than equilibrium at the higher temperatures. As the flame temperatures fell, the CO concentrations declined, converging towards the equilibrium value. The CO reaction was first order with respect to the CO concentration, insensitive to variation in O2 concentration, and with an operational activation energy at 16 kcal. A cooling rate of 10,000 C/sec was sufficient to freeze a flame generated composition and quench the equilibration reactions. (Author abstract modified)

42895 **APTIC NO. 66515**

Lange, H. B., Jr.

NOX FORMATION IN PREMIXED COMBUSTION: A KINETIC MODEL AND EXPERIMENTAL DATA. *AICHE Symp. Ser., 68(126):17-27, 1972. 18 refs.*

A mathematical model of nitrogen oxides formation in a premix combustor was developed based on a chemical mechanism which includes 21 reactions and 14 species. Nitrogen oxides formation was measured for various field conditions in a premix natural gas combustor. Both nitric oxide and temperature were accurately specified versus residence time in the hot combustion gases. The model, using kinetic parameters reported in the literature, under-predicted the data. Agreement between model and data was improved by adjustment of some kinetic parameters, using a nonlinear optimization method. The final fit was reasonably good. The effect of design and operational variables on NOx emissions from a premix combustor were calculated using the model. Variables considered were fuel composition, air-fuel ratio, air temperature, cooling rate of the combustion gas, and flue-gas recirculation through the burner. The effect of fuel bound nitrogen was also considered. (Author abstract modified)

42896 **APTIC NO. 66469**

Leech, Charles A., III and Max S. Peters

KINETIC STUDIES OF THE NO2-CO REACTION CATALYZED BY CHROMIUM- PROMOTED IRON OXIDE. *AIChE Symp. Ser., 68(126):75-79, 1972. 17 refs.*

The kinetics of the nitrous oxide-carbon monoxide reaction catalyzed by a chromium-promoted iron oxide catalyst were investigated. The reactor was operated as a differential reactor in obtaining rate data as a function of temperature and N2O, CO, nitrogen, and carbon dioxide partial pressures. Isothermal data were obtained at 227,8, 242.0, 256.0, and 269.9 C. The only reaction products observed were N2 and CO2. Twenty one reaction rate expressions were fit to the four isothermal data sets. Only an empirical power model and a model derived on the basis of modified Freundlich isotherms fit the data well. The latter model was derived on the basis of surface reaction between CO adsorbed on a Lewis acid site and N2O adsorbed on a Lewis base site which simultaneously adsorbs CO2. The greater dependency on CO concentration than on N2O concentration and the significant retardation of CO is demonstrated by the model. (Author abstract

42897 **APTIC NO. 66549**

Slavinskaya, V. A., D. Kreile, I. Geiman, D. Eglite, and E. Dziluma

REACTIVITY OF ALKYLBENZENES IN VAPOR PHASE OXIDATION PROCESS ON VANADIUM CATALYSTS. *(Reaktsionnaya sposobnost alkilbenzolov v reaktsii parofaznogo okisleniya nad vanadiyevym katalizatorom). Text in Russian. Izv Akad. Nauk Latv. SSR. Ser. Khim., no. 3:311-314, 1972. 17 refs.*

The catalytic oxidation of benzene, toluene, o-xylene, pseudocumene, and durene in vapor phase on sodium- and nickel-doped vanadium-molybdenum phosphate catalyst was studied in a temperature range of 400-430 C. The initial hydrocarbon concentrations ranged from 0.000042 to 0.000092 mol/liter. The rates of conversion were in a narrow range of 0.0002-0.00045 mol/g hr. The rate of carbon dioxide formation decreased in the sequence pseudocumene, durene, toluene, o-xylene, and benzene. The selectivities of the formation of partial oxidation products were 63-67% for phthalic anhydride from o-xylene; 15-27% for benzoic acid from toluene; 15-22% for maleic anhydride from toluene; 13-18% for trimellitic anhydride, and 16-18% for maleic anhydride, both from pseudocumene; and 24-34% for pyromellitic acid dianhydride from durene.

42898 **APTIC NO. 66479**

Wasser, John H. and Eugene E. Berkau

COMBUSTION INTENSITY RELATIONSHIP TO AIR POLLUTION EMISSIONS FROM A MODEL COMBUSTION SYSTEM. *AIChE Symp. Ser., 68(126):39-44, 1972. 8 refs.*

A relationship was established between the relative momentum of swirl and axial air streams in an oil fired burner and the nitric oxide concentration in the exhaust gas. Swirl air variations change the combustion intensity of oil burners. Reductions in actual combustion intensity significantly reduce NO concentrations in the exhaust gases. Introduction of combustion air to a burner with swirl vanes, fuel firing rate change, and excess air level adjustment are means for changing actual combustion intensity and thereby affect NO concentrations. Optimum operating levels of these variables exist with potential for significant control of NO emissions. (Author conclusions modified)

1971

42899 **APTIC NO. 66347**

Gauthier, Daniel

THE CAPTURE OF SUBMICRONIC PARTICLES BY COLLECTOR PLATES - WIND TUNNEL INVESTIGATIONS. *(Captation des particules submicroniques par des collecteurs plans - essais en soufflerie). Text in French. Commissariat a l Energie Atomique (France), Rept. CEA-R- 4260, 92p., Nov. 1971. 13 refs.*

The deposition of submicronic particles on collector plates parallel to the flow was studied experimentally in a wind tunnel, and the validity of a theoretical model based on Brownian diffusion was tested. The aerosol sample consisted of uranine particles with a mean geometrical radius of about 0.1 micron. The average flow speeds varied from 1-10/m sec and the length of the collector plates between 1 and 10 cm. The results showed that capture was mainly due to diffusion and was in good agreement with the theoretical model; however, a noticeable deposit of particles on the front part of the collector edge was observed. Sedimentation was insignificant in almost all cases.

42900 **APTIC NO. 66500**

Silverman, Leslie, Charles E. Billings, and Melvin W. First

PROPERTIES OF PARTICLES IN RELATION TO SIZE. *In: Particle Size Analysis in Industrial Hygiene. New York, Academic Press, 1971, Chapt. 1, p. 1-24. 44 refs.*

The behavior of particles in the air is controlled by their size, shape, density, and concentration, and the associated air motion. The particle properties in relation to size are discussed, including surface characteristics and interfacial phenomena, specific gravity, and shape factors. Surface characteristics and interfacial phenomena include surface area, evaporation and condensation, light scattering, electrostatic charge, adsorption, and adhesion. The kinetic behavior of particles is also reviewed, with emphasis on fluid resistance and particle motion (gravitational sedimentation, motion in a centrifugal field, motion in an electrostatic field, impaction, and motion in a thermal gradient). Definitions of several terms used in particle size technology are presented.

1969

42901 **APTIC NO. 56355**

Jaffe, Sigmund

SOME REACTIONS OF NITROGEN DIOXIDE WITH OLEFINS. *General Motors Research Labs., Warren, Mich., Chem. React. Urban Atmos., Proc. Symp., Warren, Mich., 1969, p. 103-130. 23 refs.*

Linear free energy correlations between nitrogen dioxide rate constants and ozone and oxygen atom rate constants for a selected set of olefins yielded reasonably straight lines, supporting the contention that the rate-controlling steps in the three systems have some common elements. The rate laws in all cases were first-order in both NO2 and the olefin. Mechanically, NO2 was postulated to add to ethylene, forming an intermediate that rearranges to yield excited acetaldehyde or ethylene oxide plus nitric oxide. Reaction of the aldehyde or oxide with NO2 gave rise to free radicals which may account for the products found upon further reaction with NO2. Reaction enthalpy for the aldehyde was -38 kcal/mole, while that for the oxide was -11. The rate law derived from this mechanism agreed with second-order kinetics found experimentally. The mechanism also explained the formation of NO, carbon dioxide, nitrous oxide, water, nitromethane, methynitrate, ethylene oxide, and acetaldehyde, which were found by chromatographic analysis. Results of quantum yield measurements for the loss of NO2 in the photooxidation of the representative set of olefins are presented; and related thermal and photochemical reactions of NO2 with ethylene oxide acetaldehyde, acetone, and propionaldehyde are discussed. (Author abstract modified)

1968

42902 **APTIC NO. 66001**

Blaettner, W., G. Haenel, K. Heger, D. Plass, and K. Bullrich

ACTIVITIES IN THE FIELD OF RESEARCH ON ATMOSPHERIC RADIATION AND AEROSOL. *Woorld Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 261-264. (Aug.)*

Research on atmospheric radiation, scattering, and aerosols is summarized. Measurements were made of the real part of the complex refractive index and of the mean density of atmospheric aerosol particles. Experimental and theoretical investigations were made into the spectral and angular dependence of reflectivity and the degree of polarization of reflected radiation of various soil types. The effect of higher order scattering on the sky radiation in a turbid atmosphere was determined. Photographic measurements were made of sky radiation.

42903 **APTIC NO. 66000**

Fournet, M.

PRESERVATION OF COHERENCE IN PROPAGATION THROUGH AN AEROSOL. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 255-259. (Aug.)*

The preservation of coherence in propagation through an aerosol was investigated. The phenomena of scattering by aerosols are usually treated as phenomena where coherence is not preserved owing to the obvious disorganization of the optical paths. In actual fact, coherence is never completely destroyed. In certain cases it subsists, even to a high degree in spite of a considerable amount of extinction. This was determined by considering a parallel monochromatic light beam passing through a fog assumed to be homogeneous and monodispersed. The effect of a single droplet is analyzed by the conventional Huygens-Fresnel method, and the summation of individual effects is obtained by integration. (Author introduction modified)

42904 **APTIC NO. 66008**

Herman, M.

ASYMPTOTIC PARTIALLY POLARIZED LIGHT IN A SCATTERING AND ABSORBING MEDIUM. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France) Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 299-303. 4 refs. (Aug.)*

The asymptotic partially polarized light in a scattering and absorbing medium was investigated. A plane parallel scattering and absorbing medium, receiving on its upper surface a uniform and parallel beam of radiation was studied. The exact scattered light, inside the medium, was investigated taking into account the polarization. The scatters in the medium are assumed spherical particles. Numerical computations were made for some theoretical mediums, made of monodispered spherical particles.

42905 **APTIC NO. 65992**

Kondratyev, K. Y. and Y. M. Timofeev

NUMERICAL EXPERIMENTS ON STUDYING TRANSMISSION FUNCTIONS OF ATMOSPHERIC GASES. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 139-144. 16 refs. (Aug.)*

The transmission functions (important in infrared radiative transfer theory) of the 15 micron carbon dioxide band and the water vapor rotational band were investigated. Calculations were made for a number of spectral intervals of 5 cm to the minus 1 power width in the wavelength range of 14-17 micron where two most important bands overlap: 15 micron CO2 and rotational H2O band. With a high degree of accuracy, the transmission function of the mixture was equivalent to the product of transmission functions of the components.

42906 **APTIC NO. 66020**

Kondratyev, K. Y., Y. M. Timofeev, O. M. Pokrovsky, A. N. Tikhonov, and V. B. Glasko

ON THE SOLUTION OF SOME INVERSE PROBLEMS OF ATMOSPHERIC OPTICS. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 357-362. 11 refs. (Aug.)*

The solution of some inverse problems of atmospheric optics is described. Inverse problems consist in determining the atmospheric composition or structural parameters from the data of measuring the quantitative characteristics of the radiation field. No methods are available for the direct experimental determination of transmission function derivatives. The functions sought are assumed to be time independent. This is fulfilled with sufficient accuracy for carbon dioxide or oxygen transmission functions with a small temperature dependence.

42907 **APTIC NO. 66016**

Krekov, G. M. and G. A. Mikhailov

MONTE CARLO METHOD APPLIED TO SOME PROBLEMS OF NARROW LIGHT BEAMS PROPAGATION THEORY. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 325-338. 8 refs. (Aug.)*

The Monte Carlo method is applied to some problems of narrow light beams propagation (including that through a scattering atmosphere) theory. The use of methods of statistical modeling is dictated by the difficulty of deterministic methods of the decision of the radiation transfer equation in a number of important cases. The problems are solved through the construction of appropriate Markovian chains on a high speed computer, proceeding from the statistical character of the corpuscular transfer model. The main principles of economic modification construction of the Monte Carlo methods are derived from the integral transfer equation.

42908 **APTIC NO. 65995**

Rest, Renate

OZONE TRANSMISSION AND EMISSION AT 9.6 MICRON COMPUTED FROM ADJUSTED THEORETICAL LINE DATA. *World Meteorological Organization, Geneva (Switzerland) and International Union of Geodesy and Geophysics, Paris (France), Radiat. Incl. Satell. Tech., Proc. WMO/IUGG Symp., Bergen, Norway, 1968, WMO TN 104, 248, TP 136, p. 161-163. 10 refs. (Aug.)*

The transmission and emission of ozone at 9.6 micron was computed from adjusted theoretical line data. The accuracy of the fixed step computation is about 1% for the cases used to make the fit. The fit was based upon McCaa and Shaw s measurement of 66.6 mb with 0.41 atmo-cm O3. Tests on the reliability of the fit were made by comparison with atmospheric emission spectra. Only carefully selected seasonal mean values of O3 concentration were used, but the agreement is good.

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1974

42909 **APTIC NO. 64732**

Bartlett, D., Jr., C. S. Faulkner, II, and K. Cook

EFFECT OF CHRONIC OZONE EXPOSURE ON LUNG ELASTICITY IN YOUNG RATS. *J. Appl. Physiol., 37(1):92-96, July 1974. 24 refs.*

The effect of chronic ozone exposure on lung elasticity in 196 male Sprague-Dawley rats was investigated. The rats were exposed to 0.2 ppm O3 for 30 days. Lung weight and alveolar number were not affected, but lung volume, measured after fixation at 20 cm water transpulmonary pressure, was increased by 16%. Static pressure-volume measurements in degassed excised lungs showed that the lungs of the exposed animals were overdistended at high transpulmonary pressure, whether filled with air or with saline. Ozone exposure under these conditions caused a decreased in lung tissue elasticity, possibly mediated by an effect on collagen. (Author abstract modified)

42910 **APTIC NO. 66193**

Baumslag, Naomi, David Yeager, Linda Levin, and Harold C. Petering

TRACE METAL CONTENT OF MATERNAL AND NEONATE HAIR. *Arch. Environ. Health, 29(4):186-191, Oct. 1974. 13 refs.*

Hair samples taken from mothers and newborns were analyzed by atomic absorption spectrometry for the heavy metals zinc, copper, iron, and lead. The mean Pb value of infants head hair was higher than that found in many older children and was suggestive of placental Pb transfer. Maternal hair Cu levels were significantly correlated with levels of Pb in infants hair. Copper levels in infants hair decreased as the age of the mother increased, while the mean values of Zn decreased in mothers as parity increased. Mean hair Pb values were significantly higher in blacks than in whites, and the infants hair Cu values increased as the parity of the mothers increased only in blacks. Zinc and Fe content of infants hair was higher than mothers hair. (Author abstract modified)

42911 **APTIC NO. 66429**

Bils, Robert F.

EFFECTS OF NITROGEN DIOXIDE AND OZONE ON MONKEY LUNG ULTRASTRUCTURE. *Pneumonol. (Berlin), 150(2-4):99-111, 1974. 24 refs.*

Pulmonary ultrastructural abnormalities were studied in squirrel monkeys exposed to 30 ppm nitrogen dioxide or 3 ppm ozone for 3 hr with intermittent exercise. The lung tissues were processed either immediately after exposure or 1, 4, or 7 days later. Both transmission and scanning electron microscopy were used for observation. Initial changes caused by NO2 were the presence of fibrin in the alveoli, blebbing of the alveolar epithelium, and the removal of cilia from the terminal bronchiolar epithelium. Seven days after exposure the tissues appeared to be recovering. Three ppm O3 was more damaging to alveoli than the 30 ppm NO2. The epithelial lining was degenerating or completely gone in many loci. Where intact, the width of the blood-air barrier increased with exposure and further with delay of sacrifice. Abnormal porosity of the alveolar walls was generally observed and remained through 7 days after exposure. An unusual number of paired type 2 epithelial cells were present and contained a few to many homogeneous spherical inclusions of medium density. The results observed indicate that quantitation of morphological changes will be possible even at ambient exposures of atmospheric pollutants.

42912 **APTIC NO. 66162**

Boatman, Edwin S., Shigeru Sato, and Robert Frank

ACUTE EFFECTS OF OZONE ON CAT LUNGS. II. STRUCTURAL. *Am. Rev. Respirat. Disease, 110(2):157-169, Aug. 1974. 34 refs.*

The ultramicroscopic structure of cat lung exposed to 0.26, 0.50, or 1.0 ppm of ozone for 4.7 to 6.6 hr was determined. There were changes in lung cytology throughout the airways and parenchyma approximately proportional to the concentration of O3 administered. Desquamation of ciliated epithelium was prominent but uneven, after the two higher concentrations of O3. Altered mitochondria were most frequent in medium sized airways 0.8 mm to 1.7 mm in diameter. Pulmonary resistance increased in almost all animals exposed to 0.5 and 1.0 ppm of O3. Only two animals exposed to 0.26 ppm showed an increase. Diffusing capacity was reduced in all three exposed groups but, relative to O3 concentration, no differences between groups were found. (Author abstract modified)

42913 **APTIC NO. 66177**

Camner, Per, Margot Lundborg, and Per-Ake Hellstrom

ALVEOLAR MACROPHAGES AND 5 MICRON PARTICLES COATED WITH DIFFERENT METALS. *Arch. Environ. Health, 29(4):211-213, Oct. 1974. 12 refs.*

Rabbit alveolar macrophages are exposed in vitro to 5 micron Teflon particles coated with aluminum, beryllium, carbon, chromium, lead, manganese, silver, and uranium. Compared with silver-coated particles, the number of phagocytized particles in 1.5 hrs is higher for aluminum- and chromium-coated particles and similar for manganese- and uranium-coated particles when serum is added. The difference is less pronounced when serum is not added. Beryllium-coated particles are highly toxic for the macrophages as evidenced by increased numbers of dead macrophages and a different appearance under light microscope. (Author abstract modified)

42914 **APTIC NO. 64426**

Chernukha, T. M.

PECULIAR FEATURES OF THE JOINT ACTION OF BENZENE IN CASE OF ITS INTRODUCTION INTO THE BODY BY ORAL AND RESPIRATORY SYSTEMS. *(K kharakteristike kompleksnogo deystviya benzola pri yego peroral nom i ingalyatsionnom postuplenii v organizm). Text in Russian. Gigiena i Sanit., no. 4:18-21, 1974. 3 refs.*

The complex effect of inhaled and ingested benzene in rats was studied. The animals were fed 10 to 800 mg/kg doses of benzene, and/or exposed to 50-5000 mg/cu m concentrations. The concentration-time relationship, characterizing the development of a definite toxic effect as a function of the concentration or dose, was linear on a logarithmic scale. The equivalent concentrations and doses of benzene that produced the same inversion of the chronaxia of the antagonistic muscles were found to be 240 mg/cu m and 16,000 mg/l; 120 mg/cu m and 8000 mg/l; 60 mg/cu m and 4000 mg/l; 30 mg/cu m and 2000 mg/l, and 15 mg/cu m and 1000 mg/l. Reduced blood cholinesterase activity, and reduction of the leukocyte, erythrocyte and hemoglobin levels were among the principal symptoms of benzene poisoning. The potentiation of the effects of high doses and concentrations of benzene, and the summation effect for lower doses and concentrations were determined.

42915 **APTIC NO. 66240**

Chow, C. K., C. J. Dillard, and A. L. Tappel

GLUTATHIONE PEROXIDASE SYSTEM AND LYSOZYME IN RATS EXPOSED TO OZONE OR NITROGEN DIOXIDE. *Environ. Res., 7(3):311-319, June 1974. 30 refs.*

Exposure to rats to low concentrations of ozone (as low as 0.2 ppm) continuously for 8 days, or intermittently (8 hr/day) for 7 days, significantly increased the activities of the glutathione (GSH) peroxidase system in lung tissue. Linear regression analysis showed the increased enzymic activities to be a function of ozone concentration. Lysozyme activity was significantly increased in lung soluble and plasma, during continuous, but not intermittent, O3 exposure. The results indicated that lipid peroxidation damage occurred in lungs of rats exposed to relatively high levels of O3. Rats were exposed to relatively higher levels of nitrogen dioxide for 4 days. The activities of GSH reductase and glucose-6-phosphate dehydrogenase were significantly increased during exposure to 2.3 ppm and 6.2 ppm of NO2, respectively. There was no significant increase in the activity of GSH peroxidase in lung soluble, or of lysozyme in the plasma, during exposure to NO2. The results suggest that the mechanism of action of NO2 is different from that of O3. (Author abstract)

42916 **APTIC NO. 66438**

Dingeon, M. and Collombel

EVALUATION OF THE NUISANCES CAUSED BY ASBESTOS: ASBESTOS USED IN AUTOMOBILES. *(Evaluation des nuisances provoquees par l amiante: cas de l amiante automobile). Text in French. Pollut. Atmos. (Paris), 16(62):183-190, April-June 1974. 28 refs.*

Toxicologic and epidemiologic data on asbestos in occupationally and spontaneously exposed subjects, and the hazards of asbestos as released by automobile brake linings are discussed. Lung fibrosis, bronchopulmonar cancer, as well as pleural and peritoneal mesothelioma due to inhaled asbestos in occupationally exposed populations were determined. The latency period of asbestos-induced cancer ranges from 15 to 20 years. Crocidolite and antophyllite are more powerful carcinogens than chrysotile. The irritation of the respiratory tract is essential for the formation of lung cancer by asbestos. The carcinogenic effect of different types of asbestos may be due to and be dependent of the presence of impurities, such as chromium, iron, beryllium, magnesium, nickel, cobalt, and manganese that are carcinogenic, as well as of traces of tar, mineral oil, and benzo(a)pyrene. The metallic impurities may inhibit the benzo(a)pyrene hydroxylase activity. The increased frequency of positive findings of screenings for asbestos in the lungs of city dwellers indicates a minimum, though not negligible hazard, of asbestosis due to asbestos released by brake linings in occupationally not exposed subjects. In this respect, drum brakes, retaining worn-off asbestos particles practically quantitatively inside the brake housing, are less hazardous than disc brakes which release all worn-off asbestos into the atmosphere in nondenatured form.

42917 **APTIC NO. 66174**

Eddy, T. P.

COAL SMOKE AND MORTALITY OF THE ELDERLY. *Nature (London), 251(5471):136-138, Sept. 13, 1974. 13 refs.*

Mortality from falls in old people is so closely related to mortality from fractures of long bones, particularly of the proximal femur, that it seems related to bone fragility. Common contemporary factors may affect mortality and possibly bone fragility for both sexes. Coal smoke may be one such factor. A statistical study was made on British mortality, and death rates from falls were correlated with death rates from bronchitis and domestic smoke pollution. Mortality from falls seemed to be related to domestic smoke pollution independently of the relationship to mortality from bronchitis. Since increased smoke levels decreased ultraviolet radiation, the effect of smoke on mortality from falls and fractures may have been due to reduced endogenous synthesis by ultraviolet light.

42918 **APTIC NO. 66386**

Freeman, Gustave, Laszlo T. Juhos, Nazzareno J. Furiosi, Rowena Mussenden, Robert J. Stephens, and Michael J. Evans

PATHOLOGY OF PULMONARY DISEASE FROM EXPOSURE TO INTERDEPENDENT AMBIENT GASES (NITROGEN DIOXIDE AND OZONE). *Arch. Environ. Health, 29(4):203-210, Oct. 1974. 27 refs.*

Rats in exposure chambers were subjected to mixtures of nitrogen dioxide and ozone at levels reached in severe smog and were subsequently examined histologically for injury. The major site of injury observed was at the level of the junction of the respiratory bronchiole and the alveolar duct, somewhat more peripheral than the lesion caused by NO2 alone. Ozone, the more toxic component, was largely responsible for the injury at the selected concentrations and for the characteristic fibroblastic activity in that region. The observations suggested that potential injury from ambient smog resulted mainly from O3, whereas injury from tobacco smoke was due largely to its relatively high concentration of NO2. Smoking and residing in smoggy areas appear to be additively injurious. (Author abstract modified)

42919 **APTIC NO. 66247**

Fukuie, Noriko

BIOLOGICAL EFFECT OF HEAVY METALLIC CATALYST PARTICLES TO BE EXHAUSTED IN THE AIR. *(Jukinzoku shokubai biryushi no seibutsu ni oyobosu eikyo). Text in Japanese. Nippon Jidosha Kenkyujo Kenkyu Sokuho (Res. Lett. Japan Automob. Inst.), no. 19:63-69, March 1974.*

Copper, chromium, iron, and aluminum catalysts were administered orally to rats over a 1-month period, followed by examination of the internal organs for metal distribution and pathological changes in an investigation of the toxicity of the heavy metals. No pathological changes were observed, although the point of maximum accumulation rate was different between Cu and Cr among respective groups of rats. The results indicate that there may be an optimum absorbing concentration for each of the metals.

42920 **APTIC NO. 66379**

Fukuta, Shinji, Toru Yamamoto, Takanari Tokuhisa, Junichi Mise, and Urizo Fujii

SERUM IGE LEVEL IN CHRONIC OBSTRUCTIVE LUNG DISEASES; WITH SPECIAL REFERENCE TO BRONCHIAL ASTHMA. *(Heisokusei hai shikkan ni okeru kessei IgE chi--kikanshi zensokushorei o chushin to shite). Text in Japanese. Nihon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 12(7):386-391, July 1974. 24 refs.*

The effect of serum of IgE level in the chronic obstructive lung diseases was investigated with special reference to bronchial asthma. Serum IgE level was measured by the one step method of radioactive single radical immuno-diffusion in 73 patients with bronchial asthma, 17 with chronic pulmonary emphysema, 6 with pulmonary tuberculosis, 5 with allergic rhinitis, and 37 healthy subjects. The mean concentration of serum IgE in patients with bronchial asthma was significantly higher than in those with other diseases and healthy subjects. Thirty nine of the patients with bronchial asthma had a serum IgE level exceeding 300 U/ml. An excessively high IgE level was detected in only 2 healthy subjects. The mean concentration of serum IgE in the group with allergic asthma was about five times higher than in the group with non-allergic asthma. There was no significant correlation between serum IgE level and pulmonary function tests both in allergic and nonallergic asthma.

42921 **APTIC NO. 66239**

Garrett, Shirley and Robert Fuerst

SEX-LINKED MUTATIONS IN DROSOPHILA AFTER EXPOSURE TO VARIOUS MIXTURES OF GAS ATMOSPHERES. *Environ. Res., 7(3):286-293, June 1974. 17 refs.*

Drosophila melanogaster males, Canton-Special strain, were exposed to six different gas atmospheres to determine the sex-linked recessive lethal mutation rate utilizing the Basic technique. All of the gases (perfluorobutene-2, Genetron-23, Genetron-152A, nitrous oxide, sulfur-chloride-pentafluoride, and methyl mercaptan) were significantly mutagenic to Drosophila. Perfluorobutene-2 was studied in mixtures with compressed air, carbon dioxide, oxygen, or nitrogen to determine its effects in combination with various components of air. A gas-mixing device for exposing Drosophila was constructed for the monitoring and mixing of the gases studied. Treatment with perfluorobutene-2 produced a recessive mutation rate of 1.78% compared with 0.25% for compressed air. This was higher than any mutation rate obtained when perfluorobutene-2 was mixed with O2, N2, CO2, or compressed air. The quantity of perfluorobutene-2 present in the mixture was the principal factor in contributing to a high mutation rate. (Author abstract modified)

42922 **APTIC NO. 66249**

Hecker, Lawrence, Herbert E. Allen, Bertram D. Dinman, and James V. Neel

HEAVY METAL LEVELS IN ACCULTURATED AND UNACCULTURATED POPULATIONS. *Arch. Environ. Health, 29(4):181-185, Oct. 1974. 18 refs.*

The nonessential trace metals mercury, cadmium, and lead and the essential metal copper were analyzed in the blood and urine of 100 acculturated and 90 unacculturated individuals (Yanomamo Indians), with the levels being compared between the two populations. Copper levels were the same for both groups, while Pb and Cd were markedly lower in the unacculturated population. Mercury levels were higher in the unacculturated population, with blood levels varying according to sex and location; the high values were largely attributable to the male segment of the unacculturated population. (Author abstract modified)

42923 **APTIC NO. 66188**

Jagiello, Georgiana and Ja-Shein Lin

SODIUM FLUORIDE AS POTENTIAL MUTAGEN IN MAMMALIAN EGGS. *Arch. Environ. Health, 29(4):230-235, Oct. 1974. 19 refs.*

In vivo and in vitro experiments with mice, sheep, and cows are performed to investigate the possible mutagenicity of sodium fluoride in mammalian eggs. The in vitro experiments with animal oocytes show a low incidence of anaphase lags, suppression of polar body 1, and fragmentation with rearrangement. In vivo experiments show only a minor effect on oocyte meiotic maturation, though species variations of sensitivity to NaF suggest the need for further investigations of cow and ewe progeny in contaminated areas. (Author abstract modified)

42924 **APTIC NO. 66133**

Kendrick, Joseph, Paul Nettesheim, and Anna S. Hammons

TUMOR INDUCTION IN TRACHEAL GRAFTS: A NEW EXPERIMENTAL MODEL FOR RESPIRATORY CARCINOGENESIS STUDIES. *J. Nat. Cancer Inst., 52(4):1317-1325, April 1974. 18 refs.*

Tumor induction in animal tracheal grafts is reported, and the tracheal transplant system is discussed in relation to its use as an experimental model for respiratory carcinogenesis studies. Instillation of carcinogenic polycyclic hydrocarbons into established rat tracheal grafts resulted in the development of hyperplasia, dysplasia, and squamous metaplasia within 4-7 days. Similar epithelial changes were also induced with cigarette smoke condensate. Invasive squamous cell carcinomas developed in seven of 13 tracheal grafts between 26 and 35 weeks after instillation of 5 mg of either 3-methylcholanthrene or benzo(a)pyrene. Compared with the commonly used technique of intratracheal injection in intact animals, the tracheal transplant system requires only a relatively small amount of carcinogen to induce a high tumor incidence with a short induction time, and the cumulative carcinogen dose/unit area of respiratory tract epithelium is probably several orders of magnitude higher in this system than can be achieved with intratracheal injection into intact animals.

42925 **APTIC NO. 66304**

Maloney, Clifford J.

COMBINING MULTIPLE ATTRIBUTE OUTCOMES INTO AN OVERALL INDEX. *In: Statistical and Mathematical Aspects of Pollution Problems. John W. Pratt (ed.), New York, Marcel Dekker, 1974, Chapt. 23, p. 353-363. 8 refs.*

A statistical technique is described which may prove applicable to some pollution research, although no such application has yet occurred. The technique might be used to plot the rate of soot deposition, for example. The development of a quantitative scale for causative agents of health effects is discussed. Types of scales which are available are nominal, ordinal, interval, ratio, and fixed. The theory of probability supplies a rationale by which, given an assemblage of observations on a nominal scale, a single value of a ratio scale can be derived. The statistical technique, quantal regression, and dose-response relationships are discussed. A plausible dose-response model applicable to severity of illness (and possibly in other contexts), consists of a relation between degree of illness measured by a sickness sore and the probability of occurrence of one or more all-or-none symptoms, signs, or laboratory findings. How the illness index is to be assigned to the patient on the basis of a specified pattern of these symptoms is discussed. Construction of the sicknessscore and check of the model are reviewed.

42926 **APTIC NO. 66190**

Marienfeld, Carl J., William R. Galeota, and Raymond R. Halbert

SPONTANEOUS PNEUMOTHORAX AND FOSSIL FUELS. *Arch. Environ. Health, 29(4):195-202, Oct. 1974. 21 refs.*

A mail survey of the incidence of idiopathic spontaneous pneumothorax among students at a number of colleges and of the type of fuel used in the school power plants was conducted in order to investigate reported wide geographic variations in the disease's incidence and its preponderance in young adult males. A significant association was found between oil- and coal- fueled power plants and spontaneous pneumothorax in college students. The male-female differences were hypothesized to be due to the inhalation of acidic carbon particulates during strenuous outdoor competitive physical activities in which males are more frequently engaged than are their female peers. (Author abstract modified)

42927 **APTIC NO. 62424**

Martin, A. E.

EPIDEMIOLOGICAL SURVEYS IN THE VICINITY OF LEAD WORKS. *Proc. Roy. Soc. Med., 67(2):165-167, Feb. 1974. 1 ref.*

Because air lead concentrations 100 m from a lead factory averaged 3.0 micrograms/cu m with occasional 24-hour concentrations ranging up to 28 micrograms/cu m and because monthly lead deposits were 392 mg/sq m, and epidemiological survey was made of the blood lead levels of mothers and children in the area. In 39 children less than 5 years old living within 400 m of the factory, 41% had blood levels of more than 40 micrograms/100 ml; in 80 children living 400-500 m from the factory, only 13.7% had blood lead values above this level. Of 26 mothers living within 400 m, three had blood lead levels over 40 micrograms/100 ml; of 53 living 400-500 m from the factory, none had blood lead above this level. Where raised blood levels were found, investigations were carried out in the home to exclude possible sources of raised lead. Apart from an occasional case of pica, no abnormal cause other than dust from the factory was established. Similar investigations were taken near other lead works; blood lead concentrations were raised in a similar way. Persons with high blood lead levels were examined by doctors, and arrangements were made to lower factory lead emissions, reduce distribution of the dust, and monitor lead levels.

42928 **APTIC NO. 64718**

Matsumoto, S., S. Ueda, K. Hayashi, F. Hayashida, H. Tsukune, N. Ishii, and T. Hagiwara

ULTRAMICROMORPHOLOGICAL STUDIES ON RECONSTRUCTION OF BRONCHO- ALVEOLAR SYSTEM (PART XIII): COMPARABLE FINDINGS ON OZONE-INHALED LUNGS BY TRANSMISSION. *(Kikanshi haihokei no siakochiku ni kansuru cho bikeitaigakuteki kenkyu (sono 13) - tokuni ozon kyunyu-hai no toka-gata oyobi sosagata denken no taihi ni tsuite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), vol 12(Suppl.):15-16, March 1974. (Presented at the Japanese Society for Chest Diseases, Annual Meeting, 14th, Tokyo, Japan, April 2-3, 1974.)*

Rabbits and mice were exposed to ozone at 10 ppm for 1-4 hr/day every other day and twice a week. Immediately and several days after the exposure, a lung specimen was prepared for transmission electron microscopy, scanning electron microscopy and light microscopy. Transmission electron microscopy showed catarrhal inflammation, functional accentuation of secretory epithelium, the change of cilial cells to secretory cells, to change and disappearance of cilia and cilia roots, and increase of irregular minute cilia and then the thickening of basal membrane, and edematic and denatured bronchial walls in the bronchial region. In the alveolar region, the denaturation and fall out of alveolar epithelium accompanied by partial deformation into stimulated epithelium, hydropsic-necrotic inflammation of alveolar septum and fibrosis were noted. The corresponding findings by scanning electron microscopy in the bronchial system were anomalies of cilia; swelling, protuberance, and proliferation secretory cells; decrease and disappearance of cillia, and unevenness of cellular surfaces consistent with the irregular minute cilia.

42929 **APTIC NO. 66166**

Mizutani, Nobuyoshi

A STUDY ON INFLUENCE OF AIR POLLUTION TO CHRONIC OBSTRUCTIVE LUNG DISEASE. *(Mansei heisokusei hai shikkan ni oyobosu taiki osen no eikyo ni kansuru kenkyu). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 12(7):392-401, July 1974. 23 refs.*

The influence of air pollution on chronic obstructive lung disease (COLD) was investigated in a comparative study in the Yokkaichi and in a non-polluted area. The subjects were studied for 3 yr and matched for background including smoking. Forty pairs of bronchial asthma and 30 pairs of chronic bronchitis were matched. Hemoglobin decreased in bronchial asthma and chronic bronchitis in the Yokkaichi area, but increased in the non-polluted area. There were no changes in body weight, ECG, and chest X-P, or inflammatory and emphysematous findings. There were slightly intensive inflammatory findings in chronic bronchitis before and after in the Yokkaichi area and no changes in emphysematous findings. There was a slight decrease in yearly changes of VC and FEV (forced expiratory volume) subscript 1.0 in bronchial asthma in the Yokkaichi area. Air pollution may be responsible for the decrease of VC in the Yokkaichi area because the subjects were matched in background.

42930 **APTIC NO. 65969**

Nagaoka, S.

STUDY OF LATENT EFFECTS OF AIR POLLUTION ON HUMAN BODY (1ST REPORT). *In: Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Research Inst. for Environmental Protection (Japan), p. 85-94, 1974.*

The effects of air pollution on persons in a heavily polluted area and a comparatively clean area were compared. The chronic and latent effects of air pollution were also studied. The polluted area was an apartment-house complex adjacent to a factory in Koto Ward in Tokyo; the control area was part of Tama City, an area surrounded by green zones having no fixed emission sources. Inhabitants of these areas were medically examined by interviews, physical examinations, radiological examinations, pulmonary function tests, immuno-serological examinations, upper airway examinations, and other tests. The polluted area had a higher prevalence of cases of people complaining of difficulty recovering from colds, obstructive ventilatory impairments in pulmonary function tests (none found in the control area), high values of gamma globulin in the serum, an intermediate value of alpha-1-antitrypsin, and positive reactions to the Ra-test. The polluted area also showed a significant difference from the clean area in the prevalence of laryngeal signs, hoarseness, and lead concentration in the blood. Thus, latent effects of air pollution were clearly discovered.

42931 **APTIC NO. 66212**

Oudbier, A. J., A. W. Bloomer, H. A. Price, and R. L. Welch

RESPIRATORY ROUTE OF PESTICIDE EXPOSURE AS A POTENTIAL HEALTH HAZARD. *Bull. Environ. Contamination Toxicol., 12(1):1-9, July 1974. 9 refs.*

The impact of chronic exposure to a variety of pesticides and agricultural chemicals on human health was investigated and the actual hazards of pesticide exposure via the respiratory route were evaluated. Samples of 22 paired midget impinger and respiratory pads worn by the persons being studied were collected which represent 11 mixing operations paired with 11 spray operations. Analysis of filter pads indicated that in eight out of 11 paired mixing and spraying operations there were greater total amounts of detectable pesticides on pads used in the mixing activities. Five impinger substrates showed greater amounts during mixing, five during spraying, and one questionable. The period of pesticide mixing and tank filling presents the greater potential hazard to respiratory exposure. The midget impingers were inadequate for accurate measurements of pesticides in ambient air for comparison purposes in determining percentage inhaled. The flow rate was the primary limiting factor and the efficacy of the modified respirator in protecting the user was not determined.

42932 **APTIC NO. 64643**

Rabinowitz, M., G. W. Wetherill, and J. D. Kopple

STUDIES OF HUMAN LEAD METABOLISM BY USE OF STABLE ISOTOPE TRACERS. *Environ. Health Perspect., no. 7:145-153, May 1974. 9 refs.*

Dynamics of lead metabolism were studied by replacement of a portio of the dietary lead with stable isotope tracers and maintaining subjects of controlled diets for about 6 months. The concentration and isotopic composition of lead were determined in the diet, feces, blood, urine, facial hair, and the atmosphere, as well as in samples of bile and gastric secretions, sweat, and bone. Results for one subject have been previously reported. Preliminary data are now available for a second subject. Although the data on the two subjects are basically similar, there are also significant differences. The two subjects have different blood lead concentrations (0.25 and 0.18 microgram/g). Both subjects received the same dietary and similar atmospheric lead exposure, and the lead concentration of their blood was in a nearly steady state. The difference in blood lead concentration appears primarily attributable to differences in the fraction of lead absorbed from the gut, although there are also differences in other physiological parameters, as well as probable small differences in their intake of atmospheric lead. The quantity of lead absorbed from a typical atmosphere (Pb concentration 1-2 micrograms/cu m) is 15 + or - 3 micrograms/day. Measurement of the contribution of atmospheric lead to the lead intake of the second subject was also carried out by the removal of lead from the atmosphere. Decline in the blood concentration of lead of normal isotopic composition was equivalent to the removal of 15 g/day. Measurements made during the course of a day show complexities in the absorption and distribution of lead, which are averaged out on a time scale of about 5 days. (Author abstract)

42933 **APTIC NO. 66232**

Rom, William N. and Philip E. S. Palmer

THE SPECTRUM OF ASBESTOS-RELATED DISEASES. *West. J. Med., 121(1):10-21, July 1974. 73 refs.*

Diseases caused by exposure to asbestos are discussed and occupational standards ary presented. Asbestos produces asbestosis from large exposures over short latent periods. It acts as a carcinogen from small exposures over long latent periods, and induced mesothelioma with minute exposures. A close relationship to the degree of exposure is not firmly established, and why a mesothelioma should develop in some patients while in others a carcinoma of the lung develops, is not understood. The present federal standard for occupational exposure to asbestos dust is five fibers/cu cm greater than 5 micron in length as an 8 hr time weighted average. By 1976 the standard will be reduced to 2 fibers/cu cm. The asbestos worker who typically inhales 6-8 million cu cm per day will inhale 30-40 million asbestos fibers under the present standard to be reduced to 12-16 million under the future standard. It is not known whether the 2 fibers/cu cm standard will protect the occupationally exposed worker from asbestos related disease.

42934 **APTIC NO. 66486**

Schepers, Gerrit W. H.

THE BIOLOGICAL ACTION OF TALC AND OTHER SILICATE MINERALS. *Bureau of Mines Information Circ., no. 8639:49-76, 1974. 9 refs. (Presented at the Symposium on Talc, Washington, D. C., May 8, 1973.)*

The physiochemical relationships of silicates were reviewed, with particular reference to their biological effects on occupationally exposed persons. Talc and tremolite are biologically relatively inert substances, contrasting sharply with the marked pathogenicity of amosite and crocidolite. Chrysotile occupies an intermediate position, though it is somewhat closer to talc and tremolite in its biological action. Epidemiological studies definitely associate crocidolite exposure with lung cancer, while no evidence exists that exposure to talc or tremolite induces neoplastic lesions. There is also some doubt as to the role of chrysotile in carcinogenesis, with studies thus far being contradictory. The sequelae and complications of asbestos exposure include bronchiectasis and cor pulmonale; obstructive bronchopathy and emphysema do not normally occur as a consequence of asbestos exposure. Talc and tremolite exposure are devoid of any pathological responses.

42935 **APTIC NO. 66261**

Schmoldt, A., H. F. Benthe, and W. Buergener

CHANGES OF LIPID CONTENTS IN RAT LIVER AFTER EXPOSURE TO AEROSOLS OF POLYCHLORINATED BIPHENYLS (PCB). *(Lipidveraenderungen der Rattenleber nach Exposition mit Aerosolen polychlorierter Biphenyle (PCB)). Text in German. Int. Arch. Arbeitsmed., 33(3):183-197, 1974. 27 refs.*

Single exposure to aerosols of polychlorinated biphenyls of different chlorine content (di-, tetra-, and pentachlorobiphenyls) caused an increase of liver lipids in rats. The extent of the lipid increase depended on the chlorine content of the applied PCB mixtures. As maximum effects (controls equals 100%) of the di-, tetra-, and pentachlorobiphenyl the following values were found: 145, 160, and 350% for cholosterol; 245, 345, and 480% for triglycerides; and 155, 150, and 170% for phospholipids. After exposure to di- or tetrachlorobiphenyl, these levels were attained after 2-3 days and, with the exception of phospholipids, decreased subsequently up to the 7th day. The considerably higher concentrations following pentachlorobiphenyl application remained unchanged for a longer time and were still markedly increased after 14 days. The increase of the phospholipid content appeared to be due mainly to a proliferation of the endoplasmic reticulum. Further indications of liver cell hypertrophy were an increase in relative liver weight and RNA content.

42936 **APTIC NO. 66331**

Schreiber, Hans, Geno Saccomanno, Donald H. Martin, and Lola Brennan

SEQUENTIAL CYTOLOGICAL CHANGES DURING DEVELOPMENT OF RESPIRATORY TRACT TUMORS INDUCED IN HAMSTERS BY BENZO(A)PYRENE-FERRIC OXIDE. *Cancer Res., 34(4):689-698, April 1974. 25 refs.*

The exfoliative cytology of the lung was investigated during the induction and early development of respiratory tract tumors in hamsters. Syrian golden hamsters received multiple intracheal injections of benzo(a)pyrene-ferric-oxide for 14 wk at a cumulative dose of 45 mg benzo(a)pyrene. Almost immediately, there was a severe cytological response to the carcinogen application. The response rapidly diminished during further injections and disappeared after cessation of carcinogen administration. Death occurred, on the average, at 35.5 wk. No false negative diagnoses were made in tumor bearing animals nor were false negative diagnoses made in control animals that received Fe_2O_3 alone or in carcinogen treated animals that did not develop tumors. (Author abstract modified)

42937 **APTIC NO. 66487**

Smith, William E.

EXPERIMENTAL STUDIES ON BIOLOGICAL EFFECTS OF TREMOLITE TALC ON HAMSTERS. *Bureau of Mines Information Circ., no. 8639-43-48, 1974. 5 refs. (Presented at the Symposium on Talc, Washington, D. C., May 8, 1973.)*

Tremolite talc and various types of asbestos were intrapleurally injected into hamsters to study the carcinogenic and fibrogenic properties of each silicate. Mesotheliomas were observed in each group of animals receiving asbestos injections compared to the absence of such neoplasms in animals receiving talc injections. Throughout the tests, animals treated with preparations of chrysotile asbestos showed thick fibrous pleural adhesions extending over large areas of the lung surfaces, whereas animals treated with tremolite talc showed no more than small deposits of the mineral particles with relatively little tissue reaction.

42938 **APTIC NO. 66280**

Stauffer, D.

ON THE THEORY OF LUNG DEPOSITION OF VERY SMALL H2O-H2SO4 AEROSOLS. *Health Phys., 26(4):365-366, April 1974. 6 refs.*

The deposition of very small water-sulfuric acid aerosols in the lung is discussed. The hygroscopic growth of very small H2SO4 solution droplets is estimated to be negligible for their deposition in the lower respiratory tract. The estimated existence of a deposition maximum around 30 A is important for air pollution control. It is desirable to avoid radii near the maximum for the deposition probability in the lower respiratory tract. The typical droplet radius is expected to increase if at the time of the atmospheric aerosol formation the temperature is higher, the relative humidity is lower, or the H2SO4 production rate, from sulfur dioxide oxidation, is lower.

42939 **APTIC NO. 66418**

Thomsen, Henrik Klem and Knud Kjeldsen

THRESHOLD LIMIT FOR CARBON MONOXIDE-INDUCED MYOCARDIAL DAMAGE. *Arch. Environ. Health, 29(2):73-78, Aug. 1974. 21 refs.*

Rabbits were exposed to carbon monoxide at various concentrations and exposure times to estimate the threshold limit for myocardial damage as revealed by histological examination. Degenerative changes such as contraction bands, myofibrillar disintegration, myelin body formation, and dehiscence of the intercalated disks were observed in animals exposed for more than 4 hr to CO concentrations higher than 100 ppm. The high sensitivity of myocardium to CO exposure was explained by the binding of CO to hemoglobin and especially to myoglobin in connection with the prevailing low oxygen tension in normal myocardium. The results, as well as other recent reports on the effect of low-level CO exposure in patients with ischemic heart disease, suggested that the CO content in tobacco smoke and in heavily polluted atmospheric air may be deleterious to such patients.

42940 **APTIC NO. 66200**

Thomson, Maurice L. and Demetri Pavia

PARTICLE PENETRATION AND CLEARANCE IN THE HUMAN LUNG. *Arch. Environ. Health, 29(4):214-219, Oct. 1974. 34 refs.*

Radioactive tracer particles of 5 micron diameter are used to compare the depth of penetration into the lung during inhalation (by scanning) and the subsequent fast phase clearance (by whole lung counting) in eight healthy aged subjects and nine subjects with chronic bronchitis, with all but one subject in each group being smokers. The uniform particles penetrate deeper into the healthy lungs than into the bronchitic lungs under standard conditions. The traverse counts at 1 inch intervals in the scans of both groups regress from the helium laterally to the periphery, but the mean regression for the bronchitics significantly exceeds that for the healthy subjects. The particles are cleared from the bronchitic lungs faster than from the healthy lungs, with the mean retention at six hours being 53% in bronchitis as compared to 70% in the healthy group. (Author abstract modified)

42941 **APTIC NO. 66428**

Ulmer, W. T.

RESPIRABLE POISONS: EXPOSURE TO SO2. *(Inhalative Noxen: Schwefeldioxyd). Text in German. Pneumonol. (Berlin), 150(2-4):83-96, 1974. 42 refs.*

Reactions to sulfur dioxide in the lung are different than those in the bronchial tree, depending on the concentration and duration of exposure. Low concentration can increase the sensitivity of the bronchial receptors and higher concentrations can directly increase the airway resistance. This reaction depends also on other particles inhaled at the same time. Coal dust (8 mg/cu m) has no influence on the SO2 effect. Higher concentrations can cause chronic obstructive bronchitis, as was shown in dogs. Persons exposed to SO2 at work should be checked for the reaction of their bronchial systems.

42942 **APTIC NO. 64490**

Miyagi Prefectural Office (Japan)

THE EFFECTS OF AIR POLLUTION ON THE HEALTH OF SCHOOLCHILDREN. *(Taiki osen to gakudo no kenko chosa). Text in Japanese. Miyagi-ken Kogai Shiryo (Data Public Nuisances, Miyagi Prefect.), no. 10:103-114, Jan. 1974.*

A health investigation on schoolchildren in Tagajo (I) and Matsushima (II) areas over 3 years from 1970 was described. Questionnaires, physical examinations, indirect roentgenography, lung function examination, hematological examination, urinalysis, personal histories, and school absences were taken as health indicators. No differences were noticed between vital capacity of (I) and (II), as well as between the second rate of (I) and (II). No difference was noticed between red blood cells, white blood cells, and hemoglobin of (I) and (II). Only the morbidity of measles was more frequent in (II) than (I). Both vital capacity and one sec rates were better in 1972. Hematological parameters showed a large fluctuation, there was no local difference in lung function. The concentration sulfur dioxide in the air of Tagajo did not change much.

42943 **APTIC NO. 66310**

Flora, Robert M.

ISOLATION OF HAYFEVER ANTIGENS FROM SHORT RAGWEED POLEN (FINAL REPORT). *Worthington Biochemical Corp., Freehold, N. J., Environmental Protection Agency Contract 68-02-0566, Program Element 1AA010, Rept. EPA-650/2-74-044, 15p., April 26, 1974. 3 refs.*

Short ragweed pollen was processed to yield antigens associated with hayfever allergy. Antigens K and Ra3 were processed to purity but were collected and retained as byproducts during the preparation of antigen E. Antigen E was examined by physical and immunological means and meets high standards of purity. (Author abstract modified)

1973

42944 **APTIC NO. 66475**

Andre, Rappe

MERCURY POLLUTION AND PUBLIC HEALTH. *(Pollution par le mercure et sante publique). Text in French. J. Pharm. Belg., 28(2):265-277, 1973. 26 refs.*

The environmental effects of mercury air pollution are discussed. Agricultural and industrial air pollution by Hg is increasing. Mercury is transformed into a methylated derivative, soluble in fats, and enters in the food chains where it is accumulated. The organisms at the end of the food chains are severely threatened by mercuric intoxication. The maximum allowable concentrations and acceptable daily intakes by ingestion are discussed in relation to the amounts found in food and cases of lethal poisoning in Japan.

42945 **APTIC NO. 66329**

Leadbeater, L.

THE ABSORPTION OF ORTHO-CHLOROBENZYLIDENEMALONONITRILE (CS) BY THE RESPIRATORY TRACT. *Toxicol. Appl. Pharmacol., vol. 25:101- 110, 1973. 7 refs.*

Cats and rats were exposed to particulate aerosols of the riot control agent ortho-chlorobenzylidenemalononitrile (CS). The CS and two of its metabolites, ortho-chlorobenzaldehyde (oCB) and ortho-chlorobenzylmalononitrile (CSH2) were found in the blood. All three compounds are absorbed per se from the respiratory tract, although CS is subsequently converted to CSH2 and oCB in the body. Preexposure to CS aerosols (100 mg/cu m for 5 min) on each of the two days preceding the experimental exposure reduces the absorption of CS, CSH2, and oCB. After the intragastric administration of CS to cats and rats, oCB and CSH2 are found in the blood, but CS is not detected until very large doses of CS are given (2.6 mmol/kg in the rat). All compounds are removed rapidly from the circulation. In the cat their blood half-lives are 5.5 sec CS, 9.5 sec CSH2, and 4.5 sec oCB. (Author abstract modified)

42946 **APTIC NO. 62143**

Miyaji, K., T. Takahashi, H. Kashiwagi, and M. Yanagida

THERAPY OF OBSTRUCTIVE LUNG DISEASES IN AIR POLLUTED AREAS. *(Chiryo; Taiki osen chiku ni okeru heisoku-sei hai-shikkan no chiryo). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 11(12):736-741, Dec. 1973. (Presented at the Symposium on Air Pollution and Respiratory Disease, 2nd, at the Japanese Society of Thoracic Diseases, Annual Meeting, 13th, April 1973, Paper 5.)*

In a certain air polluted district of Yokkaichi the ratio of obstructive lung disease patients to inhabitants of nonpolluted areas and to total patients is 2.2 and 2.8 for bronchial asthma, 2.7 and 2.6 for pulmonary emphysema, and 3.1 and 3.8 for asthmatic bronchitis. The therapy for these diseases, especially asthma is described. For chronic bronchitis, which has the closest causal relation to air pollution, it is best to leave the polluted area. Serious air pollution also is an accelerating factor in bronchial asthma. Patients of asthma whose onset did not come until their environment became polluted have less frequent pedigree of asthma and positivity of house-dust intracutaneous reaction than ordinary asthmatics. For the former, hospitalization in a clear air room was very effective therapy. For those who showed no improvement over one year, however, it is less effective than for ordinary asthmatics. Because of the lower positivity to intracutaneous house dust and the difficulty of finding a specific allergen these patients cannot be the object of desensitizing therapy. Therefore they are administered bronchodilating drugs which have dangerous side effects when abused. The major side effect is the stoppage of atuomatic generation of excitation due to the decrease of glycogen in cardinal leading pathways of stimulation.

42947 **APTIC NO. 59603**

Nakatani, Keitaro

HEAVY METAL POLLUTION IN AKITA PREFECTURE (MAINLY IN THE KOSAKA TOWNSHIP). *(Akita-ken no jukinzoku kogai--Kosaka-cho o chushin to shite). Text in Japanese. Chu-tsu Byoin Iho (Bull. Chu-tsu Hosp.) (Akita), 14(7):44-55, 1973.*

In June 1972, the adult fanconi syndromes were found among the residents of the Hosokoshi area, Kosaka-cho, Akita prefecture. The syndromes were attributed to cadmium and other heavy metal pollution of the environment through both water and air. The mine waste and dressing waste exposed in the mine area percolate into the water system, assisted by the rain runoff. Refinery stacks of the Kosaka mine have caused air polluion in the community for over 70 years. The smoke contains sulfur dioxide, copper, zinc, lead, cadmium, and arsenic, and pollutes the soil of irrigated fields and uncultivated land. Plotting of polluted areas on a map forms an ellipse around the stacks of the refinery. The plants grown in this soil are polluted by heavy metals. Itai- itai disease comes from an overdose of Cd which develops first into the urine capillary damages known as adult Fanconi syndrome, and progresses to osteomalacia (itai-itai). A high rate of kidney damage, high Cd content in the urine, and some Fanconi symptoms were found among the residents near the refinery, and between 1972 and 1973, some more protein urine and kidney disorders have been found among the residents of three more nearby communities. These heavy metal damages of the human body do not accompany subjective symptoms, and the damages are done when subjective symptoms begin to appear.

42948 **APTIC NO. 66466**

Port, Curtis D., Mary C. Henry, David G. Kaufman, Curtis, C. Harris, and Kathleen V. Ketels

ACUTE CHANGES IN THE SURFACE MORPHOLOGY OF HAMSTER TRACHEOBRONCHIAL EPITHELIUM FOLLOWING BENZO(A)PYRENE AND FERRIC OXIDE ADMINISTRATION. *Cancer Res., vol. 33:2498-2506, Oct. 1973. 21 refs.*

Acute changes in the surface morphology of hamster tracheobronchial epithelium were examined by scanning electron microscopy following intratracheal administration of ferric oxide or benzo(a)pyrene absorbed to ferric oxide. Multiple instillation of ferric oxide brought about a loss of ciliated cells and broad areas of abnormal, enlarged nonciliated cells with roughened or wrinkled surfaces. These were interpreted as areas of epithelial hyperplasia. Multiple intratracheal administrations of benzo(a)pyrene and ferric oxide caused similar changes and produced squamous metaplasis and small foci of markedly abnormal protuberant cells. (Author summary modified)

42949 **APTIC NO. 62175**

Rahman, Qamar, M. U. Beg, P. N. Viswanathan, and S. H. Zaidi

SOLUBILITY OF KAOLIN, TALC AND MICA DUSTS UNDER PHYSIOLOGICAL CONDITIONS. *Environ. Physiol. Biochem., 3(6):286-294, 1973. 14 refs.*

The dissolution of kaolin, talc, and mica in King s Ringer buffer, defibrinated human plasma, and serum was studied at 37 C. The dissolution of silica from the three dusts was similar. The values obtained for serum in 8 days at 37 C are comparable to the respective values for ascites fluid under similar conditions. The dissolution of silica in blood was accompanied by the leaching of metals from the dusts. This aspect has not been studied previously. During the dissolution of mica, kaolin, and talc in blood, albumin was adsorbed on the dusts as in the case of asbestos This phenomenon may be of significance in the pathogenesis of silicatosis since a lowering of plasma albumin has been observed in guinea-pigs after intratracheal injection of amosite. Citrate enhanced the dissolution of talc, kaolin, and mica, as has been observed earlier for asbestos. The increased solubility of dust particles due to citrate may affect the development of pneumoconiosis since citric acid metabolism is altered in this disease. An increased level of citrate in blood may eliminate components of dusts from the lungs.

42950 **APTIC NO. 66315**

Ramasamy, N., S. Parameshwaran, A. Redner, and S. Srinivasan

A DIFFERENTIAL PULSE STRIPPING VOLTAMMETRIC METHOD FOR THE ESTIMATION OF LEAD IN BLOOD. *Trans. Soc. Advan. Electrochem. Sci. Technol., vol. 8:50-53, April-June 1973. 12 refs.*

A differential pulse stripping voltammetric method for the estimation of blood lead is described which requires only 200 microliters of blood as compared to 3-4 ml samples used in atomic absorption analysis. Blood is digested with equal volumes of concentrated sulfuric and perchloric acids, diluted with water, and deaerated. Using a polarographic analyzer, the lead is first deposited on a hanging mercury drop electrode at a fixed potential and is subsequently stripped by linearly varying the potential in the anodic direction. The peak in the plot of the differential current versus the potential curve corresponds to the concentration of lead in the solution. Lead concentrations as low as 10 to the minus 8 M can be analyzed in 4e5 minutes. Analytical data are presented for lead levels in blood samples from healthy individuals and individuals suspected to be lead intoxicated. (Author abstract modified)

42951 APTIC NO. 66332

Simpson, G. R.

AERIAL SPRAYING OR ORGANIC PHOSPHATE PESTICIDES LOWERED BLOOD CHOLINESTERASE LEVELS OF AERIAL SPRAY OPERATORS AT WEE WAA. *Med. J. Australia, vol. 1:735-736, April 14, 1973. 1 ref.*

Organic phosphate poisoning caused by aerial spraying of organic phosphate pesticides in the Wee Waa (New South Wales) area is discussed. The main chlorinated pesticides in use are Endrin, DDT, and chlorinated camphene. The organic phosphates in use are methyl parathion, monocrotophos, mevinphos, and methyl demeton. Blood cholinesterase tests show phosphate poisoning at clinical and subclinical levels. These lowered cholinesterase levels were the direct result of not using protective clothing and proper washing facilities at the field. (Author abstract modified)

42952 APTIC NO. 65972

Spring, Kenneth R.

HEALTH AND STEEL INDUSTRY ENVIRONMENT. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y., 1971, p. 27-42, 1973. 47 refs.*

Metallurgical processes often pose significant health hazards to employees and to citizens residing nearby because of the large quantities of particulate matter and noxious gases produced. Some investigations on environmental effects of metallurgical processes are reviewed. Standards and toxicity of gases such as sulfur dioxide, oxides of nitrogen, carbon monoxide, hydrocarbons, and coal tars are reviewed. Standards and toxicity of particulates are discussed with respect to particle size and composition. Coal combustion during metallurgical processes can also produce pollutants. Residents of communities near steel plants exhibit increased mortality and morbidity, presumably as a result of their exposure to airborne contaminants. Urban air pollution does not pose as serious a threat to health as cigarette smoking, but the health effects are not negligible -- their total annual eocnomic cost has been estimated at $2.4 billion.

42953 APTIC NO. 64797

Wronska-Nofer, Teresa

DISTURBANCES OF LIPIDS METABOLISM IN RATS IN DEPENDANCE UPON CARBON DISULPHIDE CONCENTRATIONS IN THE AIR. *Med. Lavoro (Milan), 64(1-2), 1973. 18 refs.*

The effects of long-term exposure to carbon disulfide on the level of serum lipids and the rate of synthesis of liver cholesterol were studied in rats kept in air containing 0.23, 0.5, 1.0, and 1.7 mg/l CS2. After 6 mo, the rats exposed to 1.7 mg/l CS2 dropped in weight and developed paresis and paralysis of the posterior limbs. In the animals exposed to concentrations of 0.5 and 1.0 mg/l, no disorders of the nervous system were observed, however the rats gained weight significantly. The highest increase of serum lipids was observed, at CS2 concentrations of 0.5 and 1.0 mg/l. Concentrations of 0.23 mg/l gave a slight increase only after 8 mo of exposure. The rate of cholesterol synthesis was increased to the highest degree at 1.7 mg/l CS2, and no increase could be detected at 0.23 mg/l. (Author summary)

42954 APTIC NO. 61027

Yatsozhinskiy, Y. D., Y. M. Bernikova, and V. N. Molotkov

CONTENTS OF MICROELEMENTS IN LUNGS RESECTED FROM PATIENTS WITH PULMONARY TUBERCULOSIS. *(Soderzhaniye mikroelementov v legkikh, rezetsirovannykh u bolnykh tuberkulezom). Vrachebnoe Delo (Kiev), vol. 2:58-60, 1973. 4 refs. Translated from Russian, 6p.*

The contents of iron, copper, zinc, and cobalt in the resected lungs of 31 patients suffering from pulmonary tuberculosis were studied. Different quantities of microelements were found in the different lesioned portions of the lung compared to an intact section of the same lung. The maximum accumulation of copper occurred in those portions in which substantial changes in specific processes had taken place and in which Fe, Zn, and Co were depleted. Copper, zinc, and cobalt all accumulated in damaged pleura, as distinguished from accumulations in the lungs. The levels of Fe, Zn, and Co were higher and the Cu level lower in lungs/newly stricken with disease compared to those which had been ill for some time. A high content of Cu and low Fe, Zn, and Co contents were characteristic of prevailing processes in the intack and lesioned portion of the lung. Lengthy antibacterial treatment, for periods from 6 to 8 mo in combination with vitamins, resulted in an increase in the quantity of Fe, Zn, and Co in all portions of the lung, particularly in the intact lung, and to a reduction in the level of Cu. Higher contents of Fe, Zn, and Co occurred during the focal processes of tuberculosis, and lesser contents occurred during the hematogenic disseminated and infiltrative pneumonic processes. Copper was maximum in the infiltrative pneumonic form, less in the hematogenic disseminated form, and lowest in the focal form.

42955 APTIC NO. 60789

World Health Organization, International Agency for Research on Cancer Working Group on the Evalaution of the Carcinogenic Risk of Chemicals to Man

DIBENZO(H,RST)PENTAPHENE. *In: IARC Monographs on the Evaluation of the Carcinogenic Risks of Chemicals to Man: Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Vol. 3, 1973, p. 197-200. 9 refs.*

The chemical and physical properties of dibenzo(h,rst)pentaphene ($C_{28}H_{16}$) are reviewed including synonyms, chemical formulas, molecular weight, description, melting point, absorption spectroscopy, solubility and/or volatility, and chemical reactivity. Analytical methods are thin-layer chromatography and fluorescence spectroscopy. The compound has been identified in the suspended particulate matter from Kawasaki air. Twenty-seven mice were injected subcutaneously with three doses of 0.6 mg dibenzo(h,rst)pentaphene in olive oil; three males developed sarcomas after 242-320 days and six females developed sarcomas after 180-242 days. No data is available on other routes in the mouse, on other species, or on humans.

42956 APTIC NO. 62273

World Health Organization, International Agency for Research on Cancer Working Group on the Evaluation of the Carcinogenic Risk of Chemicals to Man

DIELDRIN. *In: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man: Some Organochlorine Pesticides, Vol. 5, 1973, p. 125-156. 164 refs.*

An overall view of the insecticide dieldrin is presented, including chemical and physical data; production, use, occurrence, and analysis; and the biological effects. Dieldrin is the common name approved by the International Standards Organization for a material containing not less than 85% of 1,2,3,4,10,10-hexachloro- 6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-exo-1,4-endo-5,8- dimethano-naphthalene. During an extensive monitoring of the ambient air, dieldrin could be detected in only one out of nine localities in the U. S. at a maximum level of 29.7 ng/cu m. In London and suburbs very small quantities (18-21 g/10 to the 12th power g of air) were detected and in airborne dust levels of 0.003 ppm, 0-8.1 micrograms/kg and up to 190 times 10 to the minus 15th power g/cu m of air were found. Average concentrations found in rainwater range from 5-41 ng/l. An epidemiological study carried out on occupationally exposed workers does not allow any conclusions to be made concerning the existence of an excess risk of developing cancer. Although fat concentrations of dieldrin residues were higher in terminal cancer patients than in control patients, this finding is inconclusive as to a causal relationship.

42957 **APTIC NO. 66271**

National Research Council, Ottawa (Canada), Associate Committee on Scientific Criteria for Environmental Quality

LEAD IN THE CANADIAN ENVIRONMENT (FINAL REPORT). *Pub-BY73-7(ES), 117p., Dec. 1973. 182 refs.*

Background information is presented for the geochemistry, use, release and biological effects of lead in the Canadian environment. Topics covered include: historical information; industrial and nonindustrial sources of lead release; current lead levels in the Canadian environment; lead in vegetation; the toxicity of lead to aquatic life; lead in domestic and laboratory animals; human lead intake from all sources; and epidemiology, toxicology, and diagnosis of human lead intoxication. Analytical methods and lead criteria are provided in an appendix.

42958 **APTIC NO. 66530**

BREATHING SULPHUR DIOXIDE. *Food Cosmet. Toxicol. (London), 11(6):1136-1138, Dec. 1973. 18 refs.*

A toxicological review is presented in which various experiments are cited involving animal exposure to breathing atmospheres of sulfur dioxide. Irritation of nasal mucosa and suppression of the ciliary activity which normally clears particles from the upper respiratory tract are among the local effects of the gas which is mostly absorbed through the nasal mucosa during normal nasal breathing. Histological observations include: slight thickening of the epithelium of the trachea and bronchi, an increase in the numbers of goblet cells in the trachea, enlargement of the nuclei of the epithelial cells, disappearance of numbers of mature cells, metaplasia, and ciliary loss. Studies on the effect of SO2 on pulmonary function and infection are not consistent and show in some cases antibody enhancement while in others greater susceptibility to pulmonary infection. Effect on pulmonary function appears to be minimal. Other effects cited include mild systemic arterial hypertension and inhibition of bovine erythrocyte acetylcholinesterase activity.

1972

42959 **APTIC NO. 61964**

Antweiler, H.

ORGANIC DUSTS. *(Organische Staeube). Text in German. Medizinisches Inst. fuer Lufthygiene und Silikoseforschung, 145- 154, 1972. 31 refs.*

Studies on byssinosis generated by cotton, flax, and hemp dusts, on flour-induced asthma, and on farmer s lung are reviewed. Pharmacologically active substances present in cotton dust are believed to release acutely acting substances, such as histamine, in the organism. Another study claims antibody formation due to the presence in cotton dust of a condensated polyphenol as an antigen that was actually extracted from such dust. The antibody is supposed to produce an allergic reaction of type II. A specific antigen-antibody reaction is supposed to play a certain role in the etiopathogenesis of byssinosis, among other, physical and chemical factors. An aminopolysaccharide (byssinosane), containing 2-amino-2-desoxyglucose, 2-acetamido-2-desoxyglucose, glucose, galactose, and mannose, as well as free sugar (glucose, mannose, and fructose), were isolated from water-soluble extracts from cotton dust. Correlation between the contents of acid, neutral and esterolytic proteases in cotton dust, and the emergence of byssinotic symptoms and respiratory parameters is assumed. The frequency of byssinosis was higher in a flax-spinning mill than in a cotton mill. The maximum allowable cotton dust concentration in spinning mills is set at 1 mg/cu m. Rapid destruction of Candida albicans and Aspergillus fumigatus by alveolar macrophages in guinea pigs was observed. At the same time, Micropolyspora feani was resistent to macrophages.

42960 **APTIC NO. 61708**

Hammond, E. Cuyler

SMOKING HABITS AND AIR POLLUTION IN RELATION TO LUNG CANCER. *In: Environmental Factors in Respiratory Disease. D. H. K. Lee (ed.), New York, Academic, 1972. Chapt. 12, p. 177-198. 26 refs.*

The relationship of air pollution to lung cancer is discussed. A 1959 review of the literature showed no firm evidence in support of the hypothesis that general urban air pollution increases the risk of lung cancer to an important degree, if at all. Data from more recent studies support that conclusion, although this available evidence does not rule out the possibility that general urban air pollution may lead to a slight increase in the risk of lung cancer. It also does not rule out the possibility that if no efforts were made to control air pollution, then at some future date it might increase to a level such that it would result in a significant increase in the risk of lung cancer. People who live near an industrial plant which discharges a specific type of air pollutant in considerable quantities, as asbestos dust, greatly increase the risk of lung cancer among occupationally exposed workers. It is possible that exposure of people living in the vicinity of a plant may reach dangerous levels. Data on the relationship between smoking and lung cancer are also considered. (Author conclusions modified)

42961 **APTIC NO. 62848**

Lawther, P. J.

SOME THOUGHTS ON CURRENT WORK ON AIR POLLUTION. *Ann. Hyg. Lang. Fr., 8(1):17-19, 1972.*

Various studies on the effects of air pollution on man are discussed. Although excess deaths due to smog is believed to be due to sulfur dioxide and sulfuric acid, thousands of experiments using SO2 have failed to demonstrate that this gas alone in the concentrations likely to be encountered in polluted air caused the effects. A synergistic effect between SO2 and salt was determined experimentally. Epidemiological work has indicated smoke, rather than SO2, is the cause of respiratory disease increases. Chronic effects of pollution include changes in the bronchi due to SO2, increased lung infections due to smoke s effect on viruses, and increased chronic bronchitis and lung cancer caused by smoking and air pollution. Recent decreases in atmospheric pollution have decreased toxic effects. Measurements of carbon monoxide in the blood have been made, but more work is needed on CO s effects. Nitric oxide, trace metals, beryllium, asbestos, and other pollutants also need to be studied further.

42962 **APTIC NO. 66328**

Luciak, Mieczyslaw, Stanislaw Kosmider, and Marion Drozdz

INFLUENCE OF EXHAUST COMBUSTION GASES ON THE MYOCARDIUM AND BLOOD VESSELS. *(Wplyw odlotowych gazow spalinowych na miesien serca i naczynia krwionosne). Text in Polish. Patol. Polska (Warsaw), 23(4):361-470, 1972. 13 refs.*

The influence of combustion gases on the vascular walls and myocardium of experimental animals was investigated. Combustion gases cause disorders in acid-base balance and respiratory acidosis. Disorders in lipid-carbohydrate metabolism and damage of vascular walls and myocardium were also observed.

42963 **APTIC NO. 66476**

Noweir, Madbuli H., Abdel-Aziz El-Dakhakhny, and Hassan A. Osman

EXPOSURE TO CHEMICAL AGENTS IN RUBBER INDUSTRY. *J Egypt. Pub. Health Assoc., 47(3):182-201, 1972. 36 refs.*

The occupational exposure of workers to pollutants in the rubber industry was investigated. There is a high incidence of respiratory, gastrointestinal, skin, and eye diseases among a sample of 239 workers in Egypt. Exposure to airborne dust and gaseous by-products, hydrogen sulfide, sulfur dioxide, and nitrogen dioxide was evaluated in different operations in three rubber plants. The mean levels of dusts in the different operations were lower than the threshold limit value (TLV) computed on the basis of the free silica content. The mean concentration of the gaseous by-products were much lower than their TLVs. The discrepancy between the medical and environmental findings was attributed to the irritant presence of unknown gaseous by-products and the synergistic effect of the gaseous pollutants with the aerosols. Gas-aerosol association must be considered in the evaluation of air quality standards. A control program is described. (Author summary modified)

42964 **APTIC NO. 62094**

Sarofim, A. F.

ANALYTICAL METHODS. *Environ. Res., 5(3):338-348, Sept. 1972.*

Methods used to detect and measure the concentration of polychlorinated biphenyls (PCBs) in environmental samples are reviewed including methods of extraction from fish and animal tissues, separation, identification and quantiative measurement from combined gas-liqiud chromatography/mass spectrometry, and interlaboratory comparisons. Errors caused by contamination and trace impurities are mentioned. The PCBs can be recovered from environmental samples by solvent extraction employing the methodology developed for pesticide residues with more than 70% efficiency. Organochlorine pesticides which may interfere with the subsequent gas-liquid chromatographic analysis of the PCBs are either modified chemically by treatment with alcoholic potassium hydroxide or fuming nitric acid or are separated from the PCBs by thin-layer or column chromatography. The standard method of analyzing the PCB fraction of the extract is by gas-liquid chromatography. Peaks in the chromatogram may be identified by mass spectroscopy, but more frequently are characterized by a comparison of their retention time in the chromatograph with that of a commercial PCB. Peak heights or areas measured most frequently with an electron-capture detector are used for quantitative determinations. The concentration is estimated from the ratio of the area of some or all of the peaks with the corresponding values for the commercial product having a chromatogram most similar to that of the PCB residue. The lower limit for quantitative analysis is approximately 5 ng. The details of the procedures used for analysis differ widely between different laboratories but are thought to yield concentrations with a factor of two of the correct values. (Author summary modified)

42965 **APTIC NO. 66269**

World Health Organization, Geneva (Switzerland)

AIR. *In: Health Hazards of the Human Environment. Geneva, World Health Organization, 1972, p. 19-46. 122 refs.*

A review is presented on the health effects of air pollution. Topics covered include: industrial, nonindustrial, and vehicular sources of pollution: the effect of meteorological and topographic conditions; epidemiological evidence, including acute air pollution episodes in London, the Meuse Valley, and Donora, Pennsylvania; the effects of chronic air pollution exposure on mortality and morbidity; potentially hazardous air pollutants such as lead, cadmium, beryllium, mercury, manganese, arsenic, hydrogen sulfide, mercaptans, fluorides, chlorine, hydrogen chloride, asbestos, organochlorine pesticides, aeroallergens, airborne microorganisms, sulfur oxides, suspended particulates, carbon monoxide, photochemical oxidants, ozone, and nitrogen dioxide; and air quality criteria, guides, and standards.

42966 **APTIC NO. 66565**

World Health Organization, Geneva (Switzerland)

CARBON MONOXIDE. *In: Health Hazards of the Human Environment. Geneva, World Health Organization, 1972, p. 193-196. 19 refs.*

A toxicological review is presented on carbon monoxide. The gas is absorbed in the lungs where it combines reversibly with blood hemoglobin and some extravascular hemo-proteins, resulting in a reduction of oxygen carrying capacity of the blood and also interfering with the release of oxygen that is carried to the tissues. Important factors in the absorption or excretion of CO are the level of CO in the ambient air, the amount of carboxyhemoglobin in the blood, the duration of CO exposure, and the rate of ventilation of the lungs. Generally, symptoms such as lassitude, headache, and impaired coordination are not reported until saturations exceed 10%. Various studies are cited concerning the effect of different saturation levels of CO on the central nervous system, psychomoter function, and the cardiovascular system. Experiments with cholesterol-fed rabbits that were also exposed to carbon monoxide are described in which an increased incidence of atheroma was found, suggesting that the observed relationship between cardiovascular disease and cigarette smoking may be explained in terms of chronic exposure to carbon monoxide.

1970

42967 **APTIC NO. 66343**

McKissick, Gaylord E., Laurance G. Wolfe, Robert L. Farrell, Richard A. Griesemer, and A. Hellman

AEROSOL TRANSMISSION OF ONCOGENIC VIRUSES. *Sussex Univ. (England), Aerobiol. Int. Symp., 3rd, Sussex, England, 1969, p. 233-240, 1970. 11 refs. (Sept.)*

The aerosol transmission of oncogenic viruses was investigated to determine the feasibility of animal infection by tumor viruses via the aerosol route. Experiments were conducted with mice, monkeys, and hamsters on the aerosol transmission of four agents: Yaba virus, Rauscher Murine Leukemia virus, Adenovirus type 12, and Rous Sarcoma virus. Both Yaba and Rauscher virus are readily transmitted via the aerosol route. Evidence for transmission of the Adenovirus is presented. Evidence demonstrating transmission of the Rous Sarcoma virus to a simian species is very inconclusive. Tumor viruses can be readily transmitted via the aerosol route to susceptible hosts. (Author summary modified)

42968 **APTIC NO. 66341**

Mims, C. A.

THE PATHOGENESIS OF VIRAL INFECTIONS OF THE RESPIRATORY TRACT. *Sussex Univ. (England), Aerobiol., Int. Symp., 3rd, Sussex, England, 1969, p. 241-247, 1970. 29 refs. (Sept.)*

The transmission of viral infections of the respiratory tract are discussed. Respiratory viral infections are associated with crowding, or at least with certain population densities and certain types of crowding. Infection does not come from chemically polluted air, but from air polluted from other people s respiratory secretions, although the role of chemical pollution in potentiating infection and subsequent disease has been inadequately studied. Even domestic animals, when crowded together, have an increased incidence or respiratory viral infection.

EFFECTS-PLANTS AND LIVESTOCK

1974

42969 **APTIC NO. 66259**

Braun, G.

AIR POLLUTION - FORESTS AS INDICATORS AND PROTECTORS OF VEGETATION. *(Immissionen - Der Wald als Indikator und Schutzvegetation). Text in German. Forstwiss. Centralblatt, 93(2):91-98, 1974. 21 refs.*

Forest trees, especially Norway Spruce and Scotch Pine, are useful as biological indicators of air pollution since they react quickly with distinctly visible injuries (needle necrosis and loss) and diminished growth. Because of the accumulation of damaging substances in needles a chemical needle analysis can also be used for indicating air pollution. Because of their filtering effect and effect on air turbulence forests provide a defense against dust and gases. The rate of these effects is dependent on the structure of the forests.

42970 **APTIC NO. 66414**

Braun, G.

THE USE OF TOBACCO PLANTS AS BIOLOGICAL INDICATORS OF PHOTOCHEMICAL AIR POLLUTION AFFECTING FOREST-TREES. *(Zur Verwendung von Tabakpflanzen als Bioindikatoren waldschaedlicher, photochemischer Immissionen). Text in German. Forstwiss. Centralblatt, 93(4):221-230, 1974. 31 refs.*

In two Bavarian forests close to oil industries tobacco cultivars were exposed between May and October 1973 to test for photochemical air pollution. In one of the areas markings typical of smog damage were visible on the leaves. The intensity of damages depended on the cultivar used and was greater close to the industries than at more distant points. It cannot be excluded that the damage was caused by viral infection aggravated by air pollution. Four tobacco species from the U. S. (Beltville) 61-9, 61-10, 61-11 and 61-12 were used for the exposure tests.

42971 **APTIC NO. 66137**

Davis, Donald D. and John B. Coppolino

RELATIONSHIP BETWEEN AGE AND OZONE SENSITIVITY OF CURRENT NEEDLES OF PONDEROSA PINE. *Plant Disease Reptr., 58(7):660-663, July 1974. 10 refs.*

Ponderosa pine seedlings are exposed in a controlled chamber to acute doses of ozone at weekly intervals throughout the summer in an investigation of the relationship between age and ozone sensitivity. The needles exhibit maximum sensitivity during the third to ninth week of age, with chlorotic mottle being the most common symptom. Tip necrosis and banding are also observed to a lesser degree. The chlorotic mottle occurs on the tips of immature needles and is widespread on mature needles. Banding occasionally occurs near the tips of young needles and is located progressively toward the needle base as the needle length increases. Sensitivity to ozone decreases as the needles mature and approach their terminal length of 100-120 mm.

42972 **APTIC NO. 66432**

Godzik, S. and H. F. Linskens

CONCENTRATION CHANGES OF FREE AMINO ACIDS IN PRIMARY BEAN LEAVES AFTER CONTINUOUS AND INTERRUPTED SO2 FUMIGATION AND RECOVERY. *Environ. Pollut., 1(7):25-38, July 1974. 22 refs.*

Young bean plants were fumigated with 0.1 + or - 0.1 ppm sulfur dioxide for 6, 12, or 24 hr/day. Control plants were treated in identical chambers without SO2 in the air stream. In the primary leaves of the beans, the concentration of free amino acids changed dramatically after fumigation with SO2. In general, exposure to SO2 increased the total amount of free amino acids. Reduction of aspartic acid and glutamic acid and increase of ammonium and some other amino acids were the most characteristic features of SO2 fumigation. After a 92-hour recovery, a substantial decrease in the concentration of total amino acids occurred, although it did not reach the control level. After shorter periods of treatment with SO2, the recovery was more complete. The SO2 reduced protein synthesis in fumigated plants in comparison with control plants. After recovery, the protein content increased again to the control level in plants which had been treated up to 6 hr/day. Longer fumigation periods always resulted in a decrease in the protein concentration. Some of the observed long duration phenomena could be noted after only 1 hr of exposure. Changes in the concentrations of the free amino acids were observed even when SO2 fumigation had not yet produced any visible injury to the leaves. It seems possible to use changes in the amino acid concentrations for analyses of sublethal hidden injuries caused by SO2 fumigation. (Author abstract modified)

42973 **APTIC NO. 66252**

Haisman, Derek R.

THE EFFECT OF SULPHUR DIOXIDE ON OXIDISING ENZYME SYSTEMS IN PLANT TISSUES. *J. Sci. Food Agr., 25(7):803-810, July 1974. 32 refs.*

The effect of sulfur dioxide on oxidizing enzyme systems in plant tissues is discussed. Sulfite dips ranging in concentration from 600 to 1300 ppm of SO2 can control discoloration in peeled potatoes. Higher concentrations induce other undesirable quality changes such as flabbiness and exudation. The minimum concentration of SO2 required to prevent discoloration varies with the source and variety of the raw material, according to the level of enzyme activity and the nature of the phenolic substrates. In both apples and pears, treatment with SO2 can lead to undesirable softening of the tissue during storage. It is not known if this is through reaction with another enzymic system or by direct chemical attack. The effect of SO2 on texture is worse at low pH values.

42974 **APTIC NO. 66102**

Heldman, D. R.

FACTORS INFLUENCING AIR-BORNE CONTAMINATION OF FOODS. A REVIEW. *J. Food Sci., 39(5):962-969, 1974. 31 refs. (Presented at the Institute of Food Technologists, Annual Meeting, 33rd, Miami Beach, Fla.)*

Factors influencing airborne contamination of foods by microorganisms are reviewed. There is considerable information available on reducing airborne contamination in food processing plants. The diffusion of microbial particles with an enclosed air space is known. Airborne microbial particles are transported through an opening between two adjoining spaces. Localized control of airborne contamination can be effective under most circumstances. The ultimate control of airborne contamination would prevent the airborne viable particles from leaving the source. The use of air filters to eliminate the ventilation system as a source is the best example of the ultimate approach. Techniques should be source-oriented and must be designed especially for the source being considered. (Author summary modified)

42975 **APTIC NO. 59391**

Huttunen, Satu

EFFECTS OF AIR POLLUTION ON FOREST VEGETATION UNDER NORTHERN CONDITIONS. *Experientia Suppl., no. 20:43-53, 1974. 4 refs.*

Methodological investigations of tree damage caused by air pollution in northern Finland were conducted using dendrochronology and microanalysis. The radial growth of trees during the last 20 years was investigated in the damaged area, and the values obtained were compared with the corresponding values of trees growing in unpolluted conditions. The radial growth of pines clearly displayed variations which correlated with the activity of a fertilizer production plant which emitted fertilizer dust and toxins, particularly fluorine. An increase in radial growth first appeared after the production of saltpeter was started, while a remarkable decrease of radial growth was apparent subsequent to introduction of apatite-containing F2. Chemical analyses were mainly focused on F2, sulfur, and nitrogen compounds. Accumulation of F2 into the needles was clearly demonstrable, and microanalysis showed a fairly obvious difference between the polluted and unpolluted samples for S and chlorine.

42976 **APTIC NO. 66497**

Jones, H. C., D. Weber, and D. Balsillie

ACCEPTABLE LIMITS FOR AIR POLLUTION DOSAGES AND VEGETATION EFFECTS: SULFUR DIOXIDE. *Preprint, Air Pollution Control Assoc., Denver, Colo., 31p., 1974. 70 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-225.)*

An extensive literature review is made to define acceptable limits for sulfur dioxide air pollution dosages in relation to vegetation effects, with accpetable limits being defined as the SO2 time-average-concentrations that, when exceeded, cause a permanent, adverse effect on vegetation that can be measured in terms of known economic, ecologic, or aesthetic loss. While acceptable limits cannot be fully defined until more experimental data is obtained, the following dosages are considered adequate for preventing significant damage to vegetation: maximum 1-hour average of 0.1 ppm for any exposure; maximum 2-hour average of 0.6 ppm for any exposure (maximum peak of 0.1 ppm or less); and maximum 4-hour average of 0.4 ppm for any exposure (maximum peak of 1.0 ppm or less). Additional research is needed to determine the magnitude of acidity levels above background as a result of acid precipitation.

42977 **APTIC NO. 66091**

Lincer, Jeffrey L. and Bruce McDuffie

HEAVY METAL RESIDUES IN THE EGGS OF WILD AMERICAN KESTRELS (FALCO SPARVERIUS LINN). *Bull. Environ. Contamination Toxicol., 12(2):227-232, Aug. 1974. 23 refs.*

Atomic absorption spectrometry was used to analyze hand-mixed portions of egg samples from wild American Kestrels for mercury, copper, cadmium, and lead. Heavy metal contents were generally low. Correlations run between each metal and the respective eggshell thickness resulted in no obvious inverse relationships for Hg, Cu, or Pb, and a reported possible correlative nature of Cd with eggshell thinning could be neither supported nor challenged because of small sample size and conflicting data. The metal residue results were compared to similar data collected in other geographical areas, and differences observed were postulated to be possibly due to either species differences or differences in atmospheric concentrations of the metals.

42978 **APTIC NO. 66098**

MacDowall, F. D. H.

IMPORTANCE OF SOIL IN THE ABSORPTION OF OZONE BY A CROP. *Can. J. Soil Sci., 54(2):239-240, May 1974. 10 refs.*

The absorption of ozone by the soil in a field crop was measured. The O3 concentration in a closed tent covering tobacco plants fell from the steady state concentration by a first order decay process suggestive of diffusion to reactive surfaces. The rate of this decay, as measured by the first order rate constant, dependent most on the nature of the tent floor. The decay was slowest in the blank runs with the empty tent and plastic floor. Rapid decay occurred in tents with the unwatered field soil. The addition of the full leaf area index of a mature tobacco crop increased the rate of decrease of ozone concentration inside the tent significantly on the average, but not by more than half.

42979 **APTIC NO. 64807**

Miyake, Y.

STUDIES ON PHYSIOLOGICAL TOBACCO LEAF SPOT (PART V). RELATION BETWEEN SENSIBILITY OF TOBACCO LEAF TO OZONE AND ITS CONTENTS OF ASCORBIC ACID AND GLUTATHIONE. *(Tabako no seiriteki hanten shogai ni kansuru kenkuy (dai 5 ho) ozon kanjusei to yochu asukorubinsan, gurutachion ganryo to no kanren). Text in Japanese. Utsunomiya Tabako Shikenjo Hokoku (Bull. Utsunomiya Tobacco Exp. Sta.), no. 23:55-59, Oct. 1973. 13 refs.*

To study the relationship between the leaf-damage of tobacco plants and the contents of ascorbic acid and of glutathione in the leaves when the plants were exposed to airborne ozone at the concentration of 40 pphm, two strains of Bel W3, S (highly susceptible to ozone) and R (moderately resistant to ozone) were exposed for 3 hr respectively 40, 60 and 80th day of transplantation. Judging from the leaf-damage on 16-18th position, the susceptibility of Bel W3-S to ozone was invariably higher than that of Bel W3-R, especially when exposed to ozone on 60th day of transplantation. Generally, the contents of reduced-type ascorbic acid and total ascorbic acid were higher in the Bel W3-R leaves than in the Bel W3-S leaves. The ratio of oxidized-type ascorbic acid to reduced-type ascorbic acid was higher on the 60th day of transplantation in both strains. The content of total glutathione was higher in the younger stage of growth of Bel-W3-S plants. Foilage application of reduced-type ascorbic acid and reduced-type glutathione, lowered the degree of leaf damage by ozone-exposure. The relationship of contents of glutatihione and ascorbic acid to the nitrogen components and sugar components of tobacco leaves was discussed.

42980 **APTIC NO. 66218**

Miyamoto, S., J. Ryan, and J. L. Stroehlein

EFFECTS OF SO2 ON CALCEROUS SOILS. *Sulphur Inst. J., 10(2): 14-15, Summer 1974. 2 refs.*

While atmospheric sulfur dioxide concentrations of 0.1-0.2 ppm or less do not generally injure plants, high concentrations can cause damage. On the other hand, calcerous soils benefit from and are frequently treated with sulfur compounds to improve their cropping properties. Since there were indications that SO2 may have a beneficial effect on calcerous soils and that the soils have a high capacity for adsorbing SO2, experiments were conducted on the effects of low and high amounts of SO2 on two soils in greenhouses. Low concentrations of SO2 (equivalent to 2 tons SO2/ha-30 cm) increased vegetative growth as effectively as sulfuric acid in both soils. Ferrous sulfate increased vegetative growth in the Gothard soil, but not in the Cave soil. Gypsum had no effect. When large amounts of SO2 (up to 700 tons/ha-m) were injected into calcerous soils, no significant adverse effect occurred. Increased vegetative growth compared with untreated soils did occur. The total plant uptake, but not necessarily the concentration, of iron, manganese, zinc, and phosphorus increased. The pH decreased within an alkaline range in both soils. The high adsorption rate of the calcerous soils make them useful for disposal of SO2, while the waste SO2 can be used to improve the soil.

42981 **APTIC NO. 61780**

Nouchi, I. and T. Odaira

THE EFFECT OF OZONE ON PLANT PIGMENTS. *(Ozon ni yoru shokubutsu shikiso eno eikyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 5:56-61, March 1974. 15 refs.*

Leaves of Zelkova and Prunus yedoensis continuously exposed to 20 pphm ozone for 17 and 24 days remarkable reductions of total chlorophyll. Zelkova leaves showed a reduction of 1.958 mg/g from 3.667 mg/g, and P. yedoensis leaves were reduced from 4.277 to 2.569 mg/g chlorophyll. The ratio of a/b chlorophyll and the formation of antocyan pigment were also affected. Visible damages such as reddening or yellowing of leaves and early leaf fall, plus electron microscopic examinations of chloroplasts, prove ozone-induced necrosis of the leaves and eventually of the tree.

42982 **APTIC NO. 65968**

Nouchi, I. and T. Oodaira

EFFECTS OF OZONE ON PLANT PIGMENTS. *In: Annual Report of the Tokyo Metropolitan Research Institute for Enviromental Protection. Tokyo Metroplitan Research Inst. for Environmental Protection (Japan), p. 23-32, 1974. 15 refs.*

The effects of ozone on plants were studied, with emphasis on leaf bleaching, chlorosis, and appearance of reddish flecks on leaves. Leaves were analyzed with emphasis on ozone-induced destruction of chlorophyll and the formation of red anthocyanin pigments. Leaves were exposed to 20 pphm to O3. Pigments in Brassica pekinensis, morning glory, Zelkova serrata, and Prunus yedoensis were analyzed. Exposure to O3 decreased the amount of chlorophyll, lowered the ratio of chlorophyll a to chlorophyll b, and caused anthocyanin to form. From these results and from symptoms of O3 injury to broad leaves (such as early appearance of yellow or red pigments in the leaves and premature fall of leaves), and published microscopic observations of chloroplast, it was deduced that O3 accelerated the senescence of leaves and of the plant itself. (Author conclusions modified)

42983 **APTIC NO. 66171**

O Connor, J. A., D. G. Parbery, and W. Stauss

THE EFFECTS OF PHYTOTOXIC GASES ON NATIVE AUSTRALIAN PLANT SPECIES: PART 1. ACUTE EFFECTS OF SULPHUR DIOXIDE. *Environ Pollut., 7(1):7-23, 1974. 23 refs.*

The relative susceptibility to acute sulfur dioxide injury was determined for seedlings of 131 Australian tree and shrub species, many widely used in urban plantings. The plants were fumigated in an exposure chamber with concentrations of 0.3, 1, 2, and 3 ppm SO2. Durations of fumigations were 0.5, 1, 2, 4, and 6 hr at 3 ppm SO2; 4 hr at 2 ppm; 3 and 6 hr at 1 ppm; and 27 hr at 0.3 ppm. Acute injury occurred in sensitive species of Eucalyptus and Acacia after a 3-hour exposure to 1 ppm. Of the species tested, Eucalyptus was the most sensitive and Casuarina the most resistant. Other genera studied included Acacia, Banksia, Callistemon, Callitris, Hakea, and Melaleuca. (Author abstract modified)

42984 **APTIC NO. 66213**

Ohi, Gen, Hironobu Seki, Kazuyoshi Akiyama, and Hiroshi Yagyu

THE PIGEON, A SENSOR OF LEAD POLLUTION. *Bull. Environ. Contamination Toxicol., 12(1):92-98, July 1974. 13 refs.*

Lead concentrations were measured in adult street pigeons in downtown and suburban Tokyo to assess if the pigeons can be a useful biological indicator of certain types of environmental pollutants. Delta-aminolevulinic acid dehydratase (ALA-D) activity was measured in addition to Pb concentrations in the blood, femur, and kidney. The contrast between the places of heavy traffic and suburban areas is most clearly manifest in the Pb concentration of the femur and blood and ALA-D activity. Two pigeons had blood levels over 75 micrograms/dl but none of them appeared any different in behavior or constitution from other birds which had lower values. The respective oral and respiratory Pb intakes were calculated at 5.05 and 0.25 micrograms/day for pigeons near a bus terminal and 4.25 and 0.05 micrograms/day for pigeons near a rural farmhouse. Street pigeons are an available and sensitive indicator of regional saturnine pollution.

42985 **APTIC NO. 66211**

Pagenkopf, Gordon K. and Dennis R. Neuman

LEAD CONCENTRATIONS IN NATIVE TROUT. *Bull. Environ. Contamination Toxicol., 12(1):70-75, July 1974. 17 refs.*

The lead concentrations in native trout taken from a river adjacent to a highway were measured and compared to similarly obtained values for fish from the Federal Fish Hatchery in Boseman, Montana and from Yellowstone National Park. The automobile traffic increases the lead concentration in this region. The Pb concentrations in the West Galatin River in Southwestern Montana are in the low range of values found in other rivers in the U. S. The national average for Pb in major rivers is 23 ng/ml with a low value of 2 ng/ml. The average for the West Gallatin River is 2.81 ng/ml. Lead samples were measured in the bone, liver, and gill of the fish. The results are tabulated and show general trend in the bone data indicating that the older fish have higher Pb levels. The Pb concentrations were highest in the bone and gill tissues of the fish from the river canyon and highest in the liver from the fish from the Park. The Pb concentrations were similar to those observed for other fish.

42986 **APTIC NO. 66253**

Parbery, D. G.

THE EFFECTS OF COMMON AIR POLLUTANTS ON PLANTS. *Clean Air (J. Clean Air Soc. Australia New Zealand), 8(2):44-47, May 1974. 26 refs.*

The toxicity and effects of common air pollutants on plants are reviewed. Threshold concentrations at which damage is observed are these: sulfur dioxide, 0.15 ppm for the more sensitive species; ozone, 5-12 pphm for the more sensitive plants; and peroxyacetyl nitrate (PAN), 1 pphm to injure most plants. Fluorides do not cause injury to plants until a certain threshold value is reached, but their effects are accumulative. Damage by SO2 varies considerably according to the species of plant involved. Ozone affects plants by reducing the photosynthetic rate, thereby lowering the production potential; by interfering with the respiration rate; and by interfering with growth and reproduction. The effects of PAN are similar to O3 except it is more deadly. Considerable deposits of lead occur on vegetation including vegetables, growing beside busy roads. Lead is accumulative and the constant intake of low levels of Pb could have grave consequences, not to the plants, but to those eating them.

42987 **APTIC NO. 66309**

Taylor, O. C., D. B. Drummond, and P. R. Miller

ACCEPTABLE LIMITS FOR AIR POLLUTION DOSAGES AND VEGETATION EFFECTS: PEROXYACYL NITRATES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 9p., 1974 (?). 21 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-228.)*

Various plant damage studies are cited to establish acceptable limits for air pollution dosages of peroxyacyl nitrates in relation to vegetation effects. Factors other than pollutant dosage which influence damage susceptibility include: plant genetics, period and intensity of light exposure, physiological stage of leaf tissue development, and environmental factors which suppress plant growth, including temperature and relative humidity. Studies of peroxyacetyl nitrate, the least phytotoxic of the peroxyacyl nitrate series of compounds, indicate that a 2-hour exposure to approximately 10 ppb of PAN is sufficient to produce considerable glazing, bronzing, and silvering if plant and climatic conditions are favorable.

42988 **APTIC NO. 65755**

Taylor, O. C.

AIR POLLUTANT EFFECTS INFLUENCED BY PLANT-ENVIRONMENTAL INTERACTION. *Preprint, 3p., 1974. 26 refs.*

Genetic variability is a major determinant of plant tolerance to air pollution. Differences in susceptibility between species or genera are well-known, but significant variation between individuals within a variety or cultivar has been less obvious. Tolerance and characteristics of symptoms are also dependent on the way exposure to pollutant occurs. Exposure to high concentrations of toxic pollutants usually produces symptoms quite different from those produced by long exposures to low concentrations. The susceptibility of plants was greater when they were exposed to a given dose of ozone in 1 hour than when the same dose was applied in multiple exposures. A number of external and internal factors are influential in determining the susceptibility of a specific plant to an airborne toxicant. Rapid-vigorous growth usually increases susceptibility. Plants grown in intense light are more susceptible to peroxyacetyl nitrate (PAN), and low light intensity enhances susceptibility to ozone. A long dark period prior to exposure increases O3 susceptibility. Light before and after exposure to PAN is required for injury development. A long photoperiod or a long dark period (more than 24 hr) before exposure enhances O3 injury. High temperature during exposure in the field increases O3 susceptibility. High relative humidity increases susceptibility to O3 and PAN. Soil moisture deficiency reduces susceptibility to O3, PAN, and sulfur dioxide. Salinity reduces susceptibility to ozone. High nutrient concentration (nitrogen) generally increases susceptibility, while soil oxygen deficiency reduces susceptibility. Mixtures of toxicants may interact to increase or decrease plant injury. (Author summary modified)

1973

42989 **APTIC NO. 66337**

Heggestad, Howard E., Kenneth L. Tuthill, and Robert N. Stewart

DIFFERENCES AMONG POINSETTIAS IN TOLERANCE TO SULFUR DIOXIDE. *HortScience, 8(4):337-338, Aug. 1973. 5 refs.*

Eight cultivars of poinsettia, Euphorbia pulcherriam Willd. ex Klotzsch., were exposed to sulfur dioxice under controlled-environment conditions. The doses of SO2 were 1, 2, and 3 ppm for 3 hr and 3 ppm for 1 and 2 hr; 1 ppm SO2 is equal to 2617 micrograms/cu m (25 C, 760 mm Hg.). All cultivars showed more injury from SO2 when exposed to 3 ppm for 2 hr than 2 ppm for 3 hr, although the total dose was the same. A new cultivar, Ruff and Reddy, showed the most overall tolerance while Rudolph and Mikkel Blaze were least tolerant. The bracts of Annette Hegg were injured most by SO2, whereas the bracts of Ruff and Reddy and Eckespoint C-1 were not visibly injured at the dosage levels tested. The wide range in tolerance to SO2 among the eight different genotypes indicates a potential for breeding and selection of tolerant cultivars. (Author abstract modified)

42990 **APTIC NO. 66246**

Honda, Hitoshi

STUDIES ON THE RESISTANCE OF TREES TOWARDS PUBLIC NUISCANCE. IV. THE RELATIONS BETWEENS THE DRYNESS OF SOIL AND RESISTANCE FOR SULFUR DIOXIDE GAS. *(Jumoku no kogai teiko ni kansuru kenkyu. IV. dojo no kanshitsu to SO2 no teikosei). Text in Japanese. Chiba Daigaku Engei Gakubu Gajutsu Hokoku (Tech. Bull. Fac. Horticulture, Chiva Univ.), no. 21:99-102, Dec. 1973. 6 refs.*

Trees of the Zelkova serrata variety were exposed to sulfur dioxide gas in order to test the effectiveness of manuring in increasing plant resistivity. Tree growth was not good in dry soils, though damage from SO2 was less than that occurring for wet soils where growth was better.

42991 **APTIC NO. 66567**

Hutchinson, T. C.

THE IMPACT OF POLLUTION OF THE CANADIAN FLORA. *Toronto Univ., Toronto (Canada), Dept. of Botany and the Inst. of Environmental Sciences and Engineering, Rept. EL-1, 10p., Oct. 1973. 19 refs. (Presented at the Canadian Botanical Association Symposium on the Impact of Man on the Canadian Flora, Western Ontario Univ., June 1973.)*

The impact of pollution on Canadian flora is reviewed. Reducing smogs, primarily due to a combination of high sulfur dioxide and suspended particulates in a static atmosphere at temperatures from 32-40 F, are a principal factor in the bryophyte and lichen deserts observed in such cities as Montreal. Mining and smelting industries are responsible for SO2 and heavy metal pollution of the air, water, and soil; and SO2 damage to eastern white pine is evident up to 15 mi from the nearest smelting source in some cases. Lakes around the Sudbury region are heavily contaminated by copper and nickel, both of which kill algae, and the phytoplankton flora is severely depauperated. The effect of lead additives to gasoline is evident in high traffic density areas of cities and along highways were elevated Pb levels in vegetation, soil, and air have been measured. Fluoride emissions from aluminum plants and superphosphate plants also cause phytotoxic situations.

42992 **APTIC NO. 64726**

Iwamura, Y.

A STUDY ON THE RELATIONSHIP BETWEEN PLANT DAMAGE AND AIR POLLUTION. *(Jumoku-so no kogai gensho to taiki osen tono kanren ni tsuiteno kenkyu). Text in Japanese. Aomori-ken Ringo Shikenjo Hokoku (Amori Apple Exp. Stn.), 1973:89-91, Sept. 1973.*

The effects of calcium hydroxide dust emitted from a shipping yard on the black pine tree woods west of the industrial area are investigated. The wind was strong throughout the year, predominating from the west. The leaves of black pine trees were collected from 14 points and from 20 areas of underbrush. The amount of adhered dust, electric conductivity, and pH of washings were examined. The amounts of adhered dust were largest in the leaves nearest the orign of the pollutant, and there was a tendency of decrease with the increase of distance from the source. The pH showed the same tendency. Electric conductivity was affected by the pollutant in places near the source; however, in some remote places the effect seemed to be due to sea-breezes.

42993 **APTIC NO. 66562**

Sundstrom, Karl-Ragnar and Jan-Erik Hallgren

USING LICHENS AS PHYSIOLOGICAL INDICATORS OF SULFUROUS POLLUTANTS. *Ambio, 1973:13-21, 1973. 19 refs.*

A test system using lichens as physiological indicators of sulfurous pollutants is described. Air quality can be screened by measuring the photosynthetic rate of lichens in an area suspected of being polluted. In incubation chambers containing isotopically 2 labelled carbon dioxide (14CO2), the net photosynthesis can be estimated for hundreds of lichens from a polluted area. This incorporation of 14CO2 can rapidly be measured by scintillation techniques. The lichens must be taken from unpolluted areas and transplanted to polluted regions. To reduce differences local climate between the control and exposed samples, the lichens must be transplanted with their original substrate. Chemical analyses of the air must be carried parallel to the biological tests. They cannot replace the biotests because they cannot measure synergetic effects.

1972

42994 **APTIC NO. 66270**

Shabad, L. M. and Y. L. Cohan

THE CONTENTS OF BENZO(A)PYRENE IN SOME CROPS. *Arch. Geschwulstforsch., 40(3):237-243, 1972. 19 refs.*

Experiments concerning the fate of benzo(a)pyrene in the soil are described along with findings from the chemical analysis of various crops grown in contaminated soil. The main source of benzo(a)pyrene contamination of the soil is its sedimentation from air, though experiments with the soil conditioner nerosin, a shale oil derivative, indicate that this compound is also responsible for introduction of the carcinogenic pyrene into the soil. The redistribution of the pyrene across soil layers is demonstrated along with its migration into plants. The main factor of benzo(a)pyrene destruction is the activity of soil bacteria. Evaluation of the pyrene content of various crops indicates that soil levels and particular features of individual plants determine the amount of crop contamination.

1971

42995 **APTIC NO. 64554**

Craker, L. E. and J. S. Starbuck

METABOLIC CHANGES ASSOCIATED WITH OZONE INJURY OF BEAN LEAVES. *Can. J. Plant Sci. (Ottawa), vol. 52:589-597, July 1972. 23 refs.*

Bean plants were grown in a greenhouse and exposed to ozone. Metabolic processes in primary Pinto bean leaves were altered by ozone stress; decreases in levels of ribonucleic acid (RNA) and protein, and increases in ribonuclease (RNase) and free amine groups were associated with visible oxidant injury to the leaves. Treatment of bean plants with 0.15 and 0.25 microleter/l of O3 for 2 hr increase relative RNase activity in the leaves measured 2, 4, and 24 hr after treatment. The increase was progressive. No increased RNase activity occurred in leaves treated with 0.05 microliter/l O3. Leaves treated with 0.25 microliter/l O3 had decreases in RNA content of leaves, while treatment with 0.05 and 0.15 microliter/l had no significant effect. There was a progressive increase in free amine nitrogen in plants treated with 0.25 microliter/l of O3. Leaf tissue from plants treated with 0.05 and 0.15 microliter/l O3 had the same amounts of ninhydrin-sensitive groups as control plants. Protein content decreased below protein levels in control plants at 4 and 24 hr after treatment with 0.25 microliter/l O3 for 2 hr; there were increases in protein in 0.15 microliter/l O3-treated plants at 2 and 4 hr after O3 treatment and in the 0.05 microliter/l O3-treated plants immediately after O3 treatment. There were significant decreases in chlorophyll for the 0.15 and 0.25 microliter/l treatments when measured 24 hr after treatment. There were no changes in dry weight of bean leaf at any of the sampling times for any of the O3 concentrations. In plants treated with 0.05 microliter/l O3 for 2 hr there was no visible injury; in those treated with 0.15 for 2 hr there were small white flecks on the edge of the leaves; and in those treated with 0.25 for 2 hr, there was an initial wilting followed by loss of chlorophyll in interveinal areas of the leaves 24 hr after O3 treatment.

42996 **APTIC NO. 66279**

Nash, Thomas H., III

LICHEN SENSITIVITY TO HYDROGEN FLUORIDE. *Bull. Torrey Botan. Club, 98(2):103-106, March-April 1971. 20 refs.*

Lichens were exposed to hydrogen fluoride in fumigation chambers and by transplant to areas near industrial fluoride emissions to assess the sensitivity of the plants to the gas. Lichens exposed to ambient fluoride at 4 micrograms/cu m accumulated fluoride within their thalli; and, whenever the level of fluoride within the thallus exceeded 80 ppm, chlorosis was observed with subsequent degradation of pigments and disintegration of the thalli. The finding of chlorotic transplants in the field correlated with high levels of fluoride detected on lime filter papers, suggesting that ambient fluoride was the cause of lichen injury. The lichen s ability to accumulate fluoride appeared to be a function of relative humidity which determines the moisture conditions of the thallus. (Author abstract modified)

42997 **APTIC NO. 66511**

Schoenbeck, H, and H. van Haut

EXPOSURE OF LICHENS FOR THE RECOGNITION AND THE EVALUATION OF AIR POLLUTANTS. *Assoc. of Official Analytical Chemists; International Union of Pure and Applied Chemistry; The Chemical Inst. of Canada; The Agricultural Inst. of Canada; and the National Research Council of Canada, Int. Symp. Ident. Meas. Environ. Pollut., Ottawa, Ontario, 1971, p. 329-334. 31 refs. (June 14-17.)*

The use of lichens for the recognition and the evaluation of air pollutants is described. Both field and fumigation experiments proved that the lichen Parmelia physodes is measurably influenced by sulfur dioxide, hydrogen fluoride, and hydrogen chloride. There was a distinct relationship between the dose of a toxicant and the death rate. Development of methods of exposing these lichens in polluted areas and of determining their reactions made it possible to use these organisms as a biological measuring procedure. The death rate within a certain period of time was used for monitoring air pollution in both small and large areas. The use of lichens as indicators for toxicants in air can lead to a simple and inexpensive method of monitoring air pollutants. (Author abstract modified)

42998 **APTIC NO. 66491**

Teulon, Francoise

EXAMINATION OF VEGETATION AROUND A NUCLEAR PLANT EMITTING GASEOUS FLUORIDES IN ORDER TO DETECT FLUORINE POLLUTION. *(Utilisation des vegetaux pour detecter la pollution fluoree autour d une usine susceptible d emettre des effluents gazeus fluores). Text in French. Commissariat a l Energie Atomique (France), Rept. CEA-R-4207, 30p., 1971. 3 refs.*

Chemical analysis of vegetation around nuclear power plants emitting gaseous fluorides is discussed in relation to detecting fluorine pollution. The analytical method consists of a double distillation in phosphoric acid and perchloric acid followed by a spectrocolorimetric analysis (alizarine-complexon-lanthane). The analytical method allows both the efficiency of the trapping installation and the appearance of effluents at unexpected places to be checked and can also be used to determine the advisability of prohibiting the consumption of locally grown produce by humans or fodder by cattle. Research conducted to determine the relation between visible damage to certain vegetables and their fluorine contents demonstrated that such a relation appears most strongly at the leaf level; chemical analysis may thus be used to confirm or reject information obtained on the basis of visual evidence.

1968

42999 **APTIC NO. 66541**

Stein, G.

THE INFLUENCE OF INDUSTRIAL WASTE GASES FROM THE BOHEMIAN BASIN ON WOODED AREAS IN THE UPPER ERZGEBIRGE. *(Der Einfluss von Industrieabgasen aus dem Boehmischen Becken auf die Waldgebiete im oberen Erzgebirge). Text in German. Z. Meteorol., 20(1-6):106-108, 1968. 6 refs.*

Progressive forest damage has occurred in the upper regions of the Erzgebirge (East Germany and Czechoslovakia) for the last decade due to industrial waste gases and especially sulfur dioxide originating from power plants and other industries in the Bohemian Basin. The damage manifests itself in premature loss of needles, progressive thinning out, and death of entire stocks of spruce, involving all age brackets. The serious damage area amounts to 11,000 ha in Czechoslovakia and 1000 ha in East Germany, while the entire smoke-damage area is over 50,000 ha in Czechoslovakia and 15,000 ha in East Germany. Systematic air pollution monitoring has demonstrated daily average SO2 concentrations over 0.70 mg/cu m with peaks reaching 3 mg/cu m, and dust settling rates of 32 g/sq m/ mo. The snow pH was around 6. The extensive and serious damage calls for thorough regional planning in cooperation between the two countries.

1964

43000 **APTIC NO. 66540**

Hopp, H. H.

EXPERIMENTAL STUDIES ON SMOKE DAMAGES IN VINEYARDS. *(Experimentelle Untersuchungen ueber Rauchsehaeden an Reben). Text in German. Die Wein Wiss., 19(5):201-209, May 1964. 6 refs.*

Extensive smoke damage due to fluorine-containing smoke from a nearby waste incinerator plant in two vineyards was reported. Serious necrosis and death of tillers and leaves and corking of grapes were observed. The damage occurred in vineyards previously sprayed with copper-containing fungicide, while untreated vineyards and those treated with dry copper-containing fungicide or another organic fungicide without copper remained largely intact. Fumigation experiments revealed the combination of the fluorine-containing smoke, copper-containing fungicide spray, and low temperature to be responsible for the damage.

EFFECTS-MATERIALS

1974

43001 **APTIC NO. 66413**

Barton, K., S. Bartonova, and E. Beranek

THE KINETICS OF THE RUSTING OF IRON AT THE ATMOSPHERE. *(Die Kinetik des Rostens von Eisen in der Atmosphaere). Text in German. Werkstoffe Korrosion, 25(9):659-663, 1974. 18 refs.*

Experiments were carried out to describe the kinetics of active periods of atmospheric rusting. At temperatures less than 0 C the corrison velocity is independent of the sulfur dioxide content and humidity of the atmosphere. Above 0 C the corrosion rate is controlled by reactions leading to sulfate-nests and to hydrolytic rust formation. Simultaneous action of high temperature (greater than or equal to 15 C) and higher amounts of water (greater than or equal to 100 g/sq m) decreases the accelerating effect of growing SO2 contents. The corrosion velocities found are in good agreement with data calculated from long-term tests in natural environments.

43002 **APTIC NO. 64856**

Salvin, V. S.

COLORFASTNESS TO ATMOSPHERIC CONTAMINANTS. PART ONE. *Text. Chem. Color., 6(7):39-41, July 1974. 13 refs.*

The colorfastness of dyes to atmospheric nitrogen oxides is discussed. The effects of NOx and ozone on dyed fabrics of cotton, viscose, nylon, acetate, acrylic, and wool were investigated by exposing them with protection from sunlight in areas of high pollution (Los Angeles and Chicago) and low pollution (Florida and Arizona). There was fading of direct and fiber reactive dyes on cotton and viscose which confirmed the susceptibility to NOx of these dyes. Changes on other fibers such as nylon or acrylic could have been due either to NOx or O3. The expected failure of vulnerable dyes on acetate occurred. Method of evaluating fading and the development of an AATCC tet method are reviewed. The effects of variables in the test procedure on the accuracy of the method are discussed, and the method is compared with others that are also used for evaluating gas fading. (Author abstract modified)

1972

43003 **APTIC NO. 66326**

Campbell, W. E.

REDUCTION OF THE RATE OF FILM FORMATION ON SILVER AND BRASS BY PURIFICATION OF THE ATMOSPHERE. *Illinois Inst. of Tech., Elec. Contacts/1972, Int. Conf. Elec. Contact Phenom., 6th, Proc., Chicago, Ill., 1972, p. 185-194A. 10 refs.*

The effect of atmospheric contaminants on the rate of film formation on silver and brass in an industrial atmosphere was investigated by measuring the amount of film formed with and without the contaminant removal. The rate of tarnish of silver was either unaffected or slightly increased by the removal of dust, was independent of the range of humidity tested; and was greatly dependent on the rate of flow of filtered air. The tarnish rate of brass was accelerated by dust and an increase in humidity. The rate of air flow had little effect. Activated carbon was effective in an operating control office in an industrial location. Air treated with activated carbon was reduced in reactivity to brass. The corrosion rate was reduced to 1/20th of that in untreated air. Neither hydrogen sulfide nor sulfur dioxide was the direct tarnishing agent for Ag in the atmosphere studied. (Author abstract modified)

1970

43004 **APTIC NO. 66557**

Chiola, J. P.

STAINLESS STEEL IN BUILDING. *(L acier inoxydable dans le Batiment). Text in French. Corrosion (Rueil-Malmaison, Fr.), 18(2):91-99, 1970. 6 refs.*

Problems and possibilities of the use of stainless steel as a construction material, especially for exposed outer surfaces, are discussed. To preclude corrosion hazards, the proper grade of stainless steel should be chosen on the basis of climatologic and exposure tests, and as a function of the presence of emission sources nearby. Sulfur dioxide and chlorine compounds are regarded as the chief pollutants causing corrosion of stainless steel surfaces. Point corrosion of such surfaces on a new building due to the incineration of polyvinyl chloride wastes on the building site was observed. The ferritic steel with 17% chromium (grade AISI 430) is suitable for rural areas, while the austhenitic steel grades AISI 302 and 304 are most commonly used for exposed structures. In highly aggressive atmosphere, the use of AISI 316 grade steel with 18 chromium and 8-10% nickel is recommended. Special attention should be given to the passivation of the stainless steel surface.

EFFECTS-ECONOMIC

1974

43005 **APTIC NO. 66314**

Conser, P. E.

ECONOMICS OF REFINERY SULFUR MANAGEMENT. *Preprint, American Inst. of Chemical Engineers, Tulsa, Okla., 26p., 1974. (Presented at the American Institute of Chemical Engineers, National Meeting, 76th, March 10-13, 1974.)*

Processing techniques relating to oil refinery sulfur management are discussed along with comparative economics for alternative schemes. Hydrotreating amine/Claus (or Sulfox) facilities are generally favored in conjunction with a fuels refinery, the processing of primarily low-metals crudes, or a fuel catalytic cracking complex in which maximum advantage can be taken of a hydrotreated FCC feed. Flue gas desulfurization may find more ready application in existing refineries which must comply with tightened sulfur regulations or those primarily dependent on high-metals crudes or requiring a high degree of flexibility. Cooperative arrangements between refiners and adjacent power plants can result in significant cost savings. (Author conclusions modified)

43006 **APTIC NO. 66435**

Frisch, N. W. and D. W. Coy

HOT VERSUS ENLARGED ELECTROSTATIC PRECIPITATION OF FLY ASH: A COST-EFFECTIVENESS STUDY. *J. Air Pollution Control Assoc., 24(9):872-875, Sept. 1974. 15 refs.*

A study on the cost-effectiveness of hot versus enlarged electrostatic precipitation of fly ash is criticized. The original study stated that enlarged precipitation is likely to be a less costly method of attaining high collection efficiencies for low-sulfur fly ash, based on a multivariate regression analysis of 37 full-scale cold electrostatic precipitators. The predictive ability of the resulting equation, modified to include a 95% probability of attaining design efficiency, together with functions describing capital and operating costs were used to arrive at the conclusion. The criticism contends that while the overall approach presented was a good attempt to develop a more systematic method of attacking the problem and arriving at a general solution, there were many errors in the development which resulted in incorrect conclusions. Among the more serious errors was the development and acceptance of a regression model based on cold precipitation performance data which was not compatible with the observed performance of cold precipitators. The use of the same equation for hot precipitator sizing is invalid. Additionally, one of the basic parameters used to distinguish precipitator performance of coals is not meaningful for hot precipitation and is of questionable validity for cold precipitation. The study did not appear to recognize that power input to the precipitator (actually power density) is a constrained function which can hardly ever be increased to levels defined by their optimum precipitator sizing. (Author introduction modified)

43007 **APTIC NO. 66303**

Hueting, R.

A STATISTICAL SYSTEM FOR ESTIMATING THE DETERIORATION OF THE HUMAN ENVIRONMENT. *In: Statistical and Mathematical Aspects of Pollution Problems. John W. Pratt (ed.), New York, Marcel Dekker, 1974, Chapt. 9, p. 123-132. 5 refs.*

A statistical system for estimating the deterioration of the environment is described based on the classic division of the environment into components of water, air, and soil. Each component has many uses, and each use is called a function. Deterioration of the environment is defined as descreased availability of functions of an environmental component, or in other words, loss of function. By determining where competition of functions takes place in an environmental component, one can trace the losses of function that occur. The decreased availability may relate to each of the aspects of functions, quantitative, spatial, and qualitative, and therefore these functions may compete. Progress of the qualitative deterioration of the environment can be indicated by: emission of waste matter over a given period; concentration of pollution in the environment; and effects of pollution. When data on materials are known, a cost-benefit analysis can be attempted. It is easiest to determine a cost-benefit analysis for one agent and one of the functions affected by the agent. The shadow price of an environmental function is equal to the marginal elimination cost at the optimum recovery of function. Estimating environmental deterioration using the shadow price and the cost-benefit analysis is discussed.

43008 **APTIC NO. 66301**

Starrett, David and Richard Zeckhauser

TREATING EXTERNAL DISECONOMIES – MARKETS OR TAXES? *In: Statistical and Mathematical Aspects of Pollution Problems. John W. Pratt (ed.), New York, Marcel Dekker, 1974, Chapt. 5, p. 65-84. 12 refs.*

Sometimes the parties to an economic transaction do not reap all of the benefits and costs involved: there are externalities. Means to handle externalities are discussed. Tractable externality problems are described including artificial markets and taxes. Resistant externality problems are discussed including thinness of markets, nonconvexities, artificial markets, and taxes. Consumers are discussed as externality recipients. None of the decentralized schemes for dealing with externalities, even if they can be administered properly, can be expected to work in any straightforward manner when externalities are serious. An equilibrium may not even exist with artificial market setups. Even with tax schemes, which have procedures of greatest promise, there may be multiple equilibria, only one of which may be efficient. To find and enforce the optimal solution may be a costly and complex procedure. Despite these pessimistic findings, it would be wrong to conclude that a laissez-faire approach should be chosen by default. That mode of nontreatment has led to very serious present symptoms. Even rudimentary remedies, such as effluent charges or quota schemes, might be better than leaving matters unattended. Extensive research should be conducted to find positive treatments that might ameliorate existing conditions. (Author conclusions modified)

43009 **APTIC NO. 66167**

Suzuki, Yutaka, Kazuhiko Shoji, and Kazuhiro Ogawa

PHASE PLANE ANALYSIS OF WORLD SYSTEM BEHAVIOR. *Technol. Rep. Osaka Univ., 24(1155-1190):179-190, March 1974. 2 refs.*

The computer simulation method is frequently used to analyze complicated systems. Although simulation is a powerful tool for complicated systems, it has a deficiency in that whole modes of the model behavior cannot be known. From this point of view, to consider the modes of the world system behavior as a whole, simple two-dimensional mathematical models were derived using state equations. The fundamental behavior was studied by phase plane analysis. The analysis was used to systematically explain the modes of the world system behavior. The world system involves problems such as resource depletion, food shortages, and pollution, involving the flow of people, good, and money. The mathematical models discussed include a population and agricultural output model, a pollution and industrial output model, and a mineral resource and industrial output model. (Author abstract modified)

1973

43010 **APTIC NO. 65973**

Barker, John E.

THE ECONOMIC IMPACT OF THE INSTALLATION AND OPERATION OF POLLUTION ABATEMENT DEVICES. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 43-51, 1973.*

An example is presented of the effects of local and Federal pollution control regulations on a steel plant in Houston which discharges waste water into the Houston Ship Channel. A pilot plant study to develop a reliable method of biological treatment of wastes is described. A fail-safe system of deep wells was chosen as the best method of protecting the environment, but the Federal government ordered a stop to the drilling.

Then a Federal court ordered a stop to all discharge of waste with no time to correct the problem. The cost of cleaning the environment will equal $5-6 billion annually for the next five or six years to control air and water pollution. In 1968, 271 companies spent $289 for air and water pollution control. From 1951 to 1965, the steel industry spent $210 million for the water control. Capital costs and operating costs have been increased by pollution control. Inflation further increases control costs. Often it can cost a great deal more to control pollution to a certain level than to control it at a slightly smaller level. Changing of standards can require sudden changes in control technologies which may involve scrapping previously useful control methods.

43011 **APTIC NO. 65977**

Heller, R. N.

PLANT AVAILABILITY VERSUS CLEAN AIR: AN ECONOMIC DILEMMA THAT CAN BE SOLVED. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 147-168 1973.*

Examples are discussed of how plant availability can be and has been restricted by the need to comply with atmospheric pollution regulations. The economic consequences of the lack, until now, of effective isolating equipment which is necessary to ensure maximum plant flexibility and availability are assessed. The essential requirements that must be satisfied by effective safe-access isolators are discussed, and they are related to the solutions of the problems previously considered. When industrial plants such as power stations are forced to close, even for relatively short periods, due to failures in the gas cleaning equipment, environmental outages occur which cost lost production time. Systems to increase plant availability are discussed. Isolating equipment must be effective, safe, reliable, and easily operated.

43012 **APTIC NO. 66294**

Norco, Jay E.

COST EFFECTIVENESS OF CARBON MONOXIDE CONTROL STRATEGIES (FINAL REPORT). *Environmental Technology Assessment, Oak Brook, Ill., Illinois Inst. for Environmental Quality Proj. 10.025, Rept. IIEQ 73-11, 91p., Sept. 1973. 34 refs.*

NTIS: PB 228444

Cost effectiveness studies are presented for carbon monoxide control strategies for the city of Chicago. The following topics are considered: CO air quality levels in Chicago and base line data for evaluating strategies using the proportional or rollback method; the transportation plan submitted by the State of Illinois in April of 1973; emissions, costs, effectiveness, and feasibility of the strategies considered; and recommended further research related to transportation control measures for Chicago.

43013 **APTIC NO. 65976**

Thaxton, Larry A. and Richard G. Genton

THE INTERACTION OF THE SOCIOECONOMIC AND ECOLOGICAL ENVIRONMENTS IN AMERICAN STEEL MILL TOWNS. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y. 1971, p. 129-145, 1973. 7 refs.*

The hypothesis that as the pollution level in the local environment is minimized by installation of control system, the socioeconomic indicators of that locale will display an increased level of benefit and enjoyment derived by the populace from those institutions comprising the socio-economic environment, is discussed by examining four cities. In relating pollution controls to the standard of living, the cost of excess deaths must be considered. The pollution problems in steelmaking are described as an example. Air pollution, water pollution, particulate emissions, and control systems are discussed. The case studies of four steel mill towns are used to compare the effects of environmental pollution control systems on socioeconomic factors in the towns.

STANDARDS AND CRITERIA

1974

43014 **APTIC NO. 62868**

Dikun, P. P.

VALID PRINCIPLES FOR THE STANDARDIZATION OF CARCINOGENIC SUBSTANCES. *(K voprosu vozmozhnykh printsipakh normirovaniya kantserogennykh veshchestv). Text in Russian. Gigiena i Sanit., no. 2:91-95, 1974. 7 refs.*

The possibility of the standardization of carcinogens (including polycyclic aromatic hydrocarbons and 3,4-benzo(a)pyrene) generated by various combustion and technological processes, such as internal combustion engines and meat smoking, is discussed. This technological approach, imposing emission standards rather than carcinogen concentration standards, would result in a considerable reduction of the 3,4-benzo(a)pyrene content in automobile exhaust gases and in smoked meat products. The imposition of a zero tolerance level for carcinogenic substances is realistic due to the limited sensitivity of detection.

43015 **APTIC NO. 61506**

Hishida, Kazuo

POINTERS FOR ENVIRONMENTAL STANDARDS AND THE TOTAL EMISSION REGULATIONS. *(Kankyo yoryo to soryo kisei e no shiko). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(5):15-27, May 1974.*

The total sulfur oxide emission in 1980 is estimated at about 22 million tons, which is almost triple that in 1970. Establishment of environmental capacity and standards is necessary in order to control air pollution. The establishment requires a complete investigation and classification of sources of pollution, preparation of meteorological data and data on each pollutant, pollution estimation using diffusion models, preparation of environmental simulation models and control simulations, environmental investigation of plants, factor analysis by digital and analog computation, and estimations of the living environment and urban structures. Investigations on fixed and moving sources from 1971 to 1972 in Tokyo led to the establishment of emission coefficients for sulfur oxides, nitrogen oxides, particulates, carbon monoxide, hydrocarbons, and aldehydes.

43016 **APTIC NO. 61911**

Oshio, Toshiki

MAXIMUM LOCAL EMISSION STANDARDS AND EMISSION REGULATIONS. *(Chiikibetsu haishutsu kyoyoryo to haishutsu kisoku). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(5):29-35, May 1974.*

Air pollution from both fixed and moving sources has been a problem in Osaka area. The average sulfur oxide concentration of 1970 in Nishiyodogawa ward of Osaka was six times that of the environmental standard. The concentrations of other pollutants at different locations were also remarkably higher than the environmental standard values, ranging from 2 to 11 times as high. Investigations were conducted in 1971 to establish local emission standards and regulations, aiming at reducing by approximately 65% to 90% the SOx and nitrogen oxides in various areas. The local emission standards were determined by a reducing rate which in turn was determined by actual air polution measurements and diffusion model studies. The SOx and NOx concentrations in the southern Osaka area, the most polluted in metropolitan Osaka, were expected to be reduced by 84% and 72%, respectively.

43017 **APTIC NO. 66302**

Pikul, Robert

DEVELOPMENT OF ENVIRONMENTAL INDICES. *In: Statistical and Mathematical Aspects of Pollution Problems. John W. Pratt (ed.), New York, Marcel Dekker, 1974, Chapt. 8, p. 103-121. 5 refs.*

An initial formulation of environmental indices is presented. The indices are categorized into the following classes: air pollution, water pollution, hazardous substances, land management, waste disposal, recycling, resources, natural phenomena, social aesthetic conditions, population statistics, human health, biological health and ecological balance, economic loss, and control measures. The intended uses of these indices are to describe environmental status and trends, to guide environmental policy and legislation, and to evaluate effects of environmental policies and programs. Over 100 indices have been proposed in the 14 environmental classes. A method of rating indices, taking cost and value considerations into account, is discussed. An example of the definition and calculation of an index of air quality is presented. (Author summary)

43018 **APTIC NO. 66152**

Quarles, John

MARYLAND AND VIRGINIA STATE IMPLEMENTATION PLANS. *Federal Register, 39(123):22947, June 25, 1974.*

The revised portions of the Maryland implementation plan dealing with meeting sulfur oxide national standards and of the Virginia plan dealing with meeting particulate standards have been approved. The Maryland plan does not alter the present emission limits for SOx. It demonstrates that implementation and enforcement of the existing Maryland regulations in the Metropolitan Baltimore Intrastate Region will be sufficient to achieve the national secondary ambient air quality standard for SOx by 1975. The Virginia plan does not alter the present emission limitations for particulate matter. The implementation and enforcement of existing Virginia regulations in the State Capital Intrastate Region will be sufficient to achieve the secondary standards for particulate matter by 1975.

43019 **APTIC NO. 66219**

Quarles, John

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES. EVAPORATIVE EMISSIONS COMPLIANCE PROCEDURES. *Federal Register, 39(133):25320-25324, July 10, 1974.*

The current evaporative emissions measurement technique is an adsorption tray technique using activated charcoal canisters to collect evaporative emissions of fuel vapor. The Environmental Protection Agency is currently developing a more effective test procedure for use in certification testing which will allow more complete measurement of evaporative emissions and associated new evaporative emission standards, but the technique is not expected to be available for about 2 years. In the interim, EPA will make an alternative evaporative emission compliance procedure available for evaluating those vehicles whose evaporative emission control systems and their application remain unchanged from model year to model year. Since redundant testing of evaporative emission control systems which do not change from year to year is costly and inefficient, the evaporative emission compliance procedure was shortened. The shorter test evaluates the performance of the control systems on the basis of the data generated by similar prior model year systems. The more economical exhaust emission test procedure can be used to determine compliance with the exhaust emissions standards only. The shorter exhaust emission test procedure was developed by deleting all portions of the Federal Test Procedure which are included in that test only to provide for evaporative emissions preconditioning and measurement. The resulting shorter test yield equivalent exhaust emission results when compared to the full procedure.

43020 **APTIC NO. 66151**

Train, Russell E.

PENNSYLVANIA. APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register, 39(154):28535-28536, Aug. 8, 974.*

A proposal is given for a plan to attain national sulfur dioxide clean air standards as required by section 110 of the Clean Air Act in the Metropolitan Philadelphia Interstate Air Quality Control Region. A review of air quality data from the existing monitoring stations in the Region showed an absence of violations of the secondary standard. Given the ongoing abatement measures in the Region, the lack of violations is sufficient evidence of the present implementation plan s adequacy in attaining the secondary standard by July 1974. Public comments at a hearing and written comments are solicited.

43021 **APTIC NO. 66186**

Train, Russell E.

STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES. EMISSION MONITORING REQUIREMENTS AND PERFORMANCE TESTING METHODS. *Federal Register, 39(177):32852-32858, Sept. 11, 1974.*

Emission monitoring requirements and performance testing methods are proposed for meeting standards of performance for new stationary sources. The source owner or operator must demonstrate at each source the capability of continuous monitoring systems to meet the performance specifications. These proposed regulations contain procedures for determining whether a continuous monitoring system meets thy performance specifications. Demonstration of compliance with these specifications at each source results in more reliable data from these systems. Specifications are proposed for systems which monitor opacity, nitrogen oxides, oxygen, and sulfur dioxide. The validity of these specifications was evaluated in depth by extensive testing programs at steam generating facilities.

43022 **APTIC NO. 66336**

Dept. of Health, Education, and Welfare, Washington, D. C., National Inst. for Occupational Safety and Health

NIOSH RECOMMENDED STANDARD FOR OCCUPATIONAL EXPOSURE TO VINYL CHLORIDE. *8p., 1974.*

GPO

The recommended occupational health standard by the National Institute for Occupational Safety and Health for the manufacture of synthetic polymer from vinyl chloride is presented. The requirements for regulated areas include: routine operations, reactor and vessel entry, maintenance and decontamination activities, general regulated area requirements, signs, information, and training, reports, and medical surveillance. There is no threshold limit for vinyl chloride gas in the atmosphere. When any employee is exposed to measurable concentrations of vinyl chloride, as determined by the recommended sampling and analytical method, he must wear an air-supplied respirator. This recommendation is based upon some preliminary information that the standard chemical cartridge respirators are inefficient in protecting against vinyl chloride.

LEGAL AND ADMINISTRATIVE

1974

43023 **APTIC NO. 66192**

Alm, Alvin L.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. APPROVAL OF PLAN REVISION: WEST VIRGINIA. *Federal Register, 39(168): 31321-31322, Aug. 28, 1974.*

The approval of a proposed revision to the West Virginia Implementation Plan is announced. The revision allows the John E. Amos Plant of Appalachian Power Co. to burn not more than 1% sulfur coal in a Priority III Region. The revision will not interfere with the attainment or maintenance of the national ambient air quality standards for sulfur dioxide.

43024 **APTIC NO. 66258**

Cleary, G.

WHO ACTIVITIES IN AIR POLLUTION CONTROL. *Clean Air (J. Clean Air Soc. Australia New Zealand), 8(2):26-29, 49, May 1974.*

The activities of the World Health Organization in air pollution control are reviewed. Criteria levels of exposure and standards were established to ensure the protection of man. Practical environmental pollution monitoring schemes were designed, developed, and put into operation. These include the promotion of uniform and comparable methods of measurement, the introduction of reliable and effective procedures for the calibration of routine sampling and analytical methods, and the development of acceptable procedures for recording, handling, and statistically analyzing data. Specific pollutants under study are carbon monoxide, sulfur dioxide, suspended particulate matter, photochemical oxidants, and oxides of nitrogen. Efforts in the prevention and control of pollution include assistance to governments in air pollution problems and assistance to research and training by way of grants and fellowships.

43025 **APTIC NO. 66112**

Coate, L. Edwin

WASHINGTON. INDIRECT SOURCE REVIEW REGULATIONS; NOTICE OF PROPOSED RULEMAKING. *Federal Register, 39(138):26167-26168, July 17, 1974.*

Public comment is solicited on whether or not the amendments to the Washington State plan for the implementation of national air quality standards with regard to reviewing indirect sources should be approved or disapproved. The amendments provide for preconstruction review and approval of complex (indirect) sources of air pollution as a revision to the state implementation plan. Sources of copies of the proposed revisions are listed.

43026 **APTIC NO. 66088**

DeFalco, Paul, Jr.

CALIFORNIA. APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register, 39(188):34571-34572, Sept. 26, 1974.*

Revisions to compliance schedule portions of an approved implementation plan for the state of California are proposed for approval by the Environmental Protection Agency. Fifty-one state compliance schedules were submitted, and all 51 schedules satisfy the requirements of 40 CFR Part 51, being consistent with the approved control strategy. Each proposed compliance schedule revision establishes a new date by which an individual air pollution source must comply with an emission limitation specified by the implementation plan.

43027 **APTIC NO. 66442**

Epstein, A. H., C. A. Leary, S. T. McCandless, B. J. Goldsmith, J. C. Goodrich, and B. H. Willis

A GUIDE FOR CONSIDERING AIR QUALITY IN URBAN PLANNING (FINAL REPORT). *Environmental Research and Technology, Inc., Lexington, Mass., Office of Air Quality Planning and Standards Contract 68-02-0567, Rept. EPA-450/3-74-020, 111p., March 1974. 8 refs.*

NTIS: PB 234341

Analytical procedures and generalized emissions data needed to generate urban configurations which are compatible with acceptable levels of air quality are presented. Procedures are outlined for establishing a planning area s air quality baseline and for defining the tolerance of a planning area toward receiving additional pollutant emissions as a function of air quality standards, existing air quality, and air quality maintenance policies. Methods are presented for determining acceptable industrial and transportation activities as a function of pollutant tolerance and generalized emission rates and for distributing land used within comprehensive plans.

43028 **APTIC NO. 66348**

Fox, Douglas G.

THE ST. LOUIS EXPERIENCE. *Preprint, Environmental Protection Agency, Washington, D. C., 25p., Aug. 1, 1974. 5 refs.*

The Regional Air Pollution Study (RAPS) of the Environmental Protection Agency is discussed. The RAPS goal is to develop and validate useful air quality simulation models in terms of pollution control relative to EPA s current standards. Specifically included in the RAPS data base are point sources, stationary area sources, mobile area sources, mobile line sources, airports, river and railroad traffic sources, and other complex sources. An attempt is being made to provide these data on an hourly basis. A program of field monitoring has began and will assure high quality. Specific plumes will be studied to determine both the dispersion and chemical reactions (sulfur dioxide conversion and nitric oxide oxidation) they undergo. Pollutant variability and averages will be studied at different land use sites. Long path monitors operating on the principle of selective absorption of a reflected laser beam will measure ozone, ammonia, carbon monoxide, and SO2 averages. The instruments will be tested and validated by using mobile sensors to map the concentration distribution as a function of distance along the path.

43029 **APTIC NO. 66434**

Fukuyoshi, Motoyuki

THE BAD ODOR PREVENTION LAW AND THE ACTUAL CONDITION OF ODOR POLLUTION. *(Akushu boshiho to akushu kogai no jittai). Text in Japanese. Preprint, Osaka Technical Assoc. (Japan) and Japan Burner Research Assoc., 36p., 1974. (Presented at the Seminar on Bad Odor Control Techniques, Osaka, Japan, Aug. 1, 1974, Paper 1.)*

The texts of the law code No. 91 concerning bad odor control, ordinances announcing the enforcement date, control and enforcement methods, and enforcement subjects are presented. The methods of bad odor measurement prescribed by law and instructions accompanying the law and ordinances are also presented. The odor control law was issued on June 1, 1971 and was enforced as of May 31, 1972. The instruction includes the system for law enforcement, the relationship between law and regulations, designation of odorous materials, the subjects for regulations, designation of control areas, establishment of emission and environmental standards, improvement suggestions and orders, the requests by city, township, and village administrators for designation of areas and standards, and odor measurement methods. Each local administrator must investigate and is reponsible for designating main odor sources, designating emission and environmental standards, for improvement suggestions and orders, enforcing measurement methods, submitting reports and carrying out inspections, and establishing systems for subsidies. Measurement methods are described for ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine.

43030 **APTIC NO. 66389**

Johnson, B. G.

DEVELOPING DATA FOR ENVIRONMENTAL IMPACT STUDIES. *TAPPI, 57(9): 81-84, Sept. 1974. (Presented at the Technical Association of the Pulp and Paper Industry, Environmental Conference, New Orleans, La., April 16-19, 1974.)*

Environmental impact studies leading to the preparation of an Environmental Report have become a common undertaking associated with almost every private or governmental activity that could potentially affect the environment. Considerable effort is being devoted to assuring that the environmental impact of a proposed development is kept at a minimum. The objective of the impact study is to develop a sufficient data base to permit a meaningful assessment of environmental conditions that exist on and in the immediate vicinity of the proposed site. With these data, the best judgment can be made relative to the expected impact from construction and operation of the planned facility prior to undertaking the project. This predictive information is reviewed by appropriate regulatory agencies (and the public), and approval to proceed is given if there is assurance that the environment will be protected. The impact study also produces the data base to which subsequent pre-operational and operational data can be compared to confirm that the initial predictions of environmental impact are valid. Consequently, defining the project scope, implementing the study plan, evaluating the results, and preparing the Environmental Report are essential steps to sound environmental planning. (Author abstract)

43031 **APTIC NO. 66404**

Jokiel, Volker, Wilhelm Knabe, and Volker Sperlich

THE A 113 FROM EMDEN TO BONN. HIGHWAY THROUGH GREENBELT. *(Die A113 von Emden nach Bonn. Autobahn durch eine Gruenzone). Text in German. Umwelt (Duesseldorf), 4(5):34-36, 1974.*

The planned highway A 113 which will connect Emden with Bonn has met with great resistance from the population because it will go right through the last recreational areas left in this urban and industrial region of the Federal Republic of Germany. The background concentrations of carbon monoxide, oxides of nitrogen, hydrocarbons, and lead are already high and would exceed the maximum allowable emission concentrations if the traffic emissions of the planned highway were added. This is demonstrated by the example of lead whose long-term emission concentration would rise to beyond 3 micrograms/cu m next to the highway which is double the limit concentration of 1.5 micrograms/cu m. Public transportation should be improved.

43032 **APTIC NO. 66570**

Leonardos, Gregory

AN OVERVIEW OF ODOR REGULATIONS. *Air Pollution Control Assoc., Pittsburgh, Pa., Western Pennsylvania Section and Technical Council, State Art Odor Control Technol., Proc. Spec. Conf., Pittsburgh, Pa., 1974, p. 3-15. 8 refs. (March 7-8.)*

An overview of state odor regulations is presented, with existing regulations being classified on the basis of public nuisance, source emission standards, or ambient odor limits specified. Listings are given for states and agencies by type of odor regulations, if any, and show that the majority of the regulations are based on the nuisance concept. A lack of uniformity exists in the regulations among agencies that appears to reflect the state-of-knowledge that exists on how odors and especially odorous pollution is to be measured. A listing is also given for states requiring odor control equipment.

43033 **APTIC NO. 66400**

Levadie, Benjamin, Robert J. Keenan, and John B. Pate

STANDARD METHODS FOR THE EXTENDED EVALUATION OF AIR QUALITY. THE ON-GOING PROJECTS. *ASTM Stand. News, 2(8):9-15, Aug. 1974. 18 refs.*

Donora, Pa. was the site of one of the most tragic environmental disasters in history. On the 27th of October, 1948, a killer smog descended on the community, choking 20 citizens to death and seriously affecting 2000 others. The incident and the resulting report to the Surgeon General caused the realization of three salient points: it is the dramatic event which often triggers action to meet an urgent problem; knowledge was needed to pin down the causes; and this knowledge was that which only competent air analysis could produce, and the only available resources at that time for the analysis were in the industrial hygiene forces of the U. S. Public Health Service. Thie history of the standardizing programs and efforts since the Donora incident are discussed. The methodology and problems encountered in the collection of valid data are described. The origin and on-going work of the ASTM Committee D-22 is outlined with particular attention to the Committee s current Project Threshold. The Federal input is discussed in terms of the recently amended Clean Air Act and the Environmental Protection Agency s role in Federal standardization. (Author abstract modified)

43034 **APTIC NO. 66406**

Mayer-Tasch, Peter C.

LEGAL PROTECTION AGAINST INDUSTRIAL POLLUTION. CRIMINAL LAW PROVIDES A WEAK WEAPON. *(Der Rechtsschutz gegen gewerbliche Immissionen. Schwache Waffe Strafrecht). Text in German. Umwelt (Duesseldorf), 4(5):50-54, 1974.*

Criminal law in the Federal Republic of Germany provides a weak weapon for a private person harmed by emissions stemming from a nearby industrial plant. In most cases it is difficult to prove any quilt or illegal conduct by the emitter. The fact that the emitting plant has been granted an operating license usually suffices to kill any move against the emitter. Civil law is of little help since most actions can be stopped by arguing that combative measures are economically unacceptable. Great importance therefore lies with the licensing process of emitting plants. It is recommended that the public be informed on all details of the plans of a future industrial enterprise according to the model provided by the U. S.

43035 **APTIC NO. 66161**

Meyers, Sheldon

ENVIRONMENTAL IMPACT STATEMENTS AND OTHER ACTIONS. AVAILABILITY OF AGENCY COMMENTS. *Federal Register, 39(165):30540-30543, Aug. 23, 1974.*

Federal agency actions impacting the environment are reviewed. A list of draft environmental impact statements which were reviewed and commented upon in writing between July 16, 1974 and July 31, 1974 is given. The list includes the Federal agency responsible for the statement, the number and title of the statement, the classification of the nature of the Environmental Agency s comments, and the EPA source for copies of the comments. The definitions and classifications of EPA s comments on the draft environmental impact statements are given. Final environmental impact statements reviewed and commented upon in writing during the reviewing period are listed with the Federal agency responsible, the number and title of the statement, a summary of the nature of the EPA s comments, and the EPA source for copies of the comments. A list is given of proposed Federal agency regulations, legislation proposed by Federal agencies, and any other proposed actions reviewed and commented upon in writing pursuant to section 309(a) of the Clean Air Act, as amended, during the referenced reviewing period. Names and addresses of the sources for copies of the EPA comments are listed.

43036 **APTIC NO. 66242**

Meyers, Sheldon

ENVIRONMENTAL IMPACT STATEMENTS AND OTHER ACTIONS IMPACTING THE ENVIRONMENT. AVAILABILITY OF COMMENTS. *Federal Register, 39(176):32644, Sept. 10, 1974.*

The availability of comments by the Environmental Protection Agency on Federal agency actions impacting the environment made from Aug. 1-15, 1974 is announced. Appendix I contains a listing of draft environmental impact statements. Appendix II contains the definitions of the classifications of the comments of Appendix I. Appendix II contains a listing of final environmental impact statements. Appendix IV contains a listing of proposed Federal Agency regulations, legislation proposed by Federal Agencies, and any other proposed actions reviewed and commented upon in writing pursuant to section 309(a) of the Clean Air Act. These appendices include the Federal agency responsible for the proposed action, the title of the action, a summary of the nature of EPA s comments, and the source for copies of the comments. Appendix V contains a listing of the names and addresses of the sources for copies of comments listed in Appendices I, III, and IV.

43037 **APTIC NO. 66107**

Morris, A. R.

VIRGINIA. PROPOSED REVISION TO IMPLEMENTATION PLAN. *Federal Register, 39(134):25503-25504, July 11, 1974.*

A proposed revision to the Virginia state implementation plan for the attainment and maintenance of national ambient air quality standards is presented, and comments are solicited. The proposal is to delete the existing preface to the state regulations for the control and abatement of air pollution which consists of background information.

43038 **APTIC NO. 66387**

Morris, A. R.

VIRGINIA IMPLEMENTATION PLAN. PROPOSED REVISION. *Federal Register, 39(191):35386-35387, Oct. 1, 1974.*

Proposed revisions to Sections I and IV of the Virginia Implementation Plan for the attainment and maintenance of national ambient air quality standards are set forth by the Environmental Protection Agency. Virginia is proposing to add to Section I definitions for a number of terms primarily related to hydrocarbon and photochemical oxidant control. Section IV proposed revisions related to the control of vapor loss during the transfer of gasoline between delivery trucks and underground storage tanks, the control of vapor loss during the transfer of gasoline from gasoline pumps to individual vehicle tanks, and to the control of the use of photochemically reactive organic solvents in dry cleaning operations. Virginia s proposed revision also includes changes to rules on carbon monoxide emissions from stationary sources and nitrogen oxide emissions from fuel burning equipment. Copies of the proposed revision are available for public inspection, and the public is invited to submit comments on whether the proposed revision should be approved or disapproved.

43039 **APTIC NO. 62580**

Narisawa, Etsuo

ORGANIC SOLVENT REGULATIONS IN THE UNITED STATES AND CHANGES OF ORGANIC SOLVENTS IN JAPAN. *(Beikoku no yuki yozai kisei to Nihon ni okeru yuki yozai no tenkan). Text in Japanese. Preprint, Japan Management Assoc., Tokyo, p. 1-18, 1974. 12 refs. (Presented at the Japan Management Association National Conference on Pollution Control Techniques, Tokyo, Japan, June 10-14, 1974, Paper 7.)*

The Tokyo Metropolitan Government, the Osaka Prefectural Government, and the Kanagawa Prefectural Government set new emission standards for hydrocarbons from organic solvents. The enforcement dates for Kanagawa is September 1972, for Tokyo, March 1974, and for Osaka, September 1974. For Tokyo, the new environmental standard for HC based on 6-9 am 3-hour averages is set for 0.35 ppm, and the target date is 1977. For the content of these new regulations, industries involving petroleum chemical, petroleum refining, coating, painting, printing solvents, and industries such as automobile and home electric appliances manufacturing are expected to be affected heavily. The 1972 consumption of toluene and xylene solvents consisted of about 50% for paint and 50% for other purposes. Including other aromatic hydrocarbon solvents, 70% of the total consumption of aromatic HC is for solvents and thinners. The chemical composition and solution properties of substitute solvents are presented in a table, and some low aromatic HC thinners developed in Japan are presented in another table. Many of these thinners contain no aromatic HC at all. For the control of evaporating HC, floating and fixed roofs for petroleum tanks are proposed in Kanagawa prefecture, and the total HC emission by evaporation is expected to decrease by more than 80%. In Tokyo, the evaporation prevention strongly recommended is the return method using an exhaust gas return hose for petroleum tanks.

43040 **APTIC NO. 66236**

O Connell, R. L.

ARIZONA. PROPOSED APPROVAL OF AIR QUALITY COMPLIANCE SCHEDULE. *Federal Register, 39(189):34671, Sept. 27, 1974.*

A compliance schedule for the Flinkote Co., Nelson, Arizona was submitted to the Environmental Protection Agency by the Director of the Arizona Department of Health Services on July 30, 1974 and was found by the EPA to satisfy the requirements of 40 CFR Part 51. The plan is proposed for approval and is available for public inspection.

43041 **APTIC NO. 62464**

Quarles, John

ASTON MARTIN LAGONDA, INC. APPLICATION FOR SUSPENSION OF 1975 EMISSION STANDARDS. *Federal Register, 39(101):18135-18136, May 23, 1974. 4 refs.*

On April 5, 1974, Aston Martin Lagonda applied for suspension of the 1975 emission standards. The procedures for disposition of this will be as follows. The applications will be made available for public review and comment. The Administrator will conduct a public hearing, if, on the basis of public comments received, he determines a useful purpose would be served thereby. Each application will be reviewed by the Environmental Protection Agency to determine whether the applicant made all good faith efforts. If any application is deemed deficient, the applicant will be notified by EPA to supplement his suspension request and, if the applicant fails to satisfactorily revise the application, the applicant will be required to appear and testify at a public hearing. The administrator will issue by Federal Register notice of his decision to grant or deny the respective applications on or before the 60th day from the day of receipt of such applications.

43042 **APTIC NO. 62465**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS: PROPOSED APPROVAL OF COMPLIANCE SCHEDULES FOR OKLAHOMA. *Federal Register, 39(100):17981-17982, May 22, 1974.*

Revised compliance schedules for Oklahoma industrial emission sources to meet the standards of the Clean Air Act are presented. Under Oklahoma law, variances cannot be granted for more than one year. However, some of the final compliance dates are later than the date of the end of the variance. For this reason, the Administrator proposes to approve unconditionally those schedule portions which fall within the variance period and to condition approval of schedule portions extending beyond the present variance period on the State s renewal of the variance in form and substance identical to the present variance. If the variance is renewed in this manner, the condition will be satisfied and the approval of the next segment of the schedule will not require further action by the State or the Administrator. If the variance is not renewed or is modified, the condition will not be satisfied, and the remainder of the schedule is not approved by the regulation proposed here. The compliance schedules which the Administrator proposes to approve are described in the regulation proposed here only by name of source, location, regulation involved, date schedule adopted, variance expiration date, and final compliance date.

43043 **APTIC NO. 64422**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. REVISIONS TO UTAH PLAN. *Federal Register, 39(113):20484-20485, June 11, 1974.*

Amendments to a regulation limiting the sulfur dioxide emission from the first operating unit of Utah Power and Light Company s Huntington Canyon power plant are promulgated by the Environmental Protection Agency administrator in response to smoke and particle tracer study results indicating that sulfur oxide dispersion rates under stable conditions are significantly greater than the rate used in the original model. The administrator is promulgating withdrawal of the sulfur dioxide regulation originally promulgated for the facility, revocation of the extension provided for the attainment of the primary standards for SO2, amendment of the Federal compliance schedule to exclude SO2 control for the first operating unit, and indication that ambient levels of SO2 in the Utah portion of the Four Corners Interstate Region are below the national standards.

43044 **APTIC NO. 66087**

Quarles, John

REGULATION OF FUELS AND FUEL ADDITIVES. CONTROLS APPLICABLE TO MOTOR VEHICLE MANUFACTURERS. *Federal Register, 39(188):34538-34539, Sept. 26, 1974.*

Amendments to prior Environmental Protection Agency regulations concerning the prevention of dispensing leaded gas to motor vehicles designed for unleaded gas only are set forth, with particular reference to the positioning of the nozzle spout within the filler inlet and nozzle flow rate during attempted filling with leaded gas. Vehicles requiring the use of unleaded gas shall have a fuel filler inlet designed so as to prevent the insertion of a fuel nozzle equal to or greater than 0.930 inches in diameter. The testing requirement that the terminal end of the spout shall be placed at various depths within the filler inlet in any manner that may be reasonably expected to be encountered is added along with a reestablished fuel flow rate of 8 plus or minus 1 gallons/min during testing for attempted fill with leaded gasoline.

43045 **APTIC NO. 66092**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. DEFERRAL OF IMPLEMENTATION PLAN REQUIREMENTS AND PUBLIC AVAILABILITY OF EMISSION DATA. *Federal Register, 39(188):34572-34574, Sept. 26, 1974.*

Replacement regulations are set forth by the Environmental Protection Agency regarding deferral of implementation plan requirements and public availability of emission data. The Administrator has decided to revise 40 CFR Part 51 (Regulations for Preparation, Adoption, and Submittal of Implementation Plans) to be consistent with decisions of Circuit Courts of Appeal stating that source compliance dates can be deferred through the mechanism of a State-issued and EPA-approved variance or enforcement order but only up to the attainment date for meeting the primary ambient air quality standards. Replacement regulations regarding the hindrance of emission data availability to the public due to confidentiality provisions provide that any person who cannot obtain emission data from the Agency responsible for making emission data available to the public, as specified in the applicable plan, may request the appropriate Regional Administrator to obtain and make public such data.

43046 **APTIC NO. 66106**

Quarles, John

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. PROPOSED COMPLIANCE SCHEDULES FOR MISSISSIPPI. *Federal Register, 39(157):28984-28994, Aug. 13, 1974.*

Revised compliance schedules are listed for the Mississippi state implementation plan, and comments are solicited. Each proposed revision establishes a new date by which an individual air pollution source must attain compliance with an emission limitation of the implementation plan.

43047 **APTIC NO. 66110**

Quarles, John

ARIZONA. APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register, 39(128):24378-24379, July 2, 1974.*

Revisions are given for compliance schedules to the approved Arizona state implementation plan. Each proposed revision establishes a new date by which an individual air pollution source must comply with an emission limitation specified by the implementation plan. Comments are solicited.

43048 **APTIC NO. 66146**

Quarles, John

CONNECTICUT. PROPOSED REVISION TO IMPLEMENTATION PLAN. *Federal Register, 39(102):18297-18298, May 24, 1974.*

A proposed revision to the Connecticut implementation plan is described and comments are solicited. The revision concerns the achievement of secondary particulate standards in Connecticut s portion of the New Jersey-New York-Connecticut and Hartford-New Haven-Springfield Interstate Air Quality Control Regions. The revision concludes that no additional control measures are necessary to achieve the secondary particulate standard by May 31, 1975.

43049 **APTIC NO. 66147**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PARTICULATE CONTROL STRATEGY FOR HAWAII. *Federal Register, 39(123): 22946-22947, June 25, 1974.*

Approval is given to a particulate control strategy to attain the national secondary standard for particulate matter as part of the Hawaii state implementation plan. The strategy consists of emission limits for process industries, incinerators, and bagasse combustion, prohibition of open burning except agricultural, and a permit system for such agricultural burning.

43050 **APTIC NO. 66148**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PUERTO RICO; APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(166): 30833-30834, Aug. 26, 1974.*

Approval is given to revised compliance schedules for the Puerto Rico implementation plan. Each of the schedules establishes a new date by which the source involved must comply with the applicable emission limitation provisions of the Federally approved state implementation plan. This date is indicated in a table under the heading final compliance date.

43051 **APTIC NO. 66153**

Quarles, John

MICHIGAN. PROPOSED REVISIONS TO IMPLEMENTATION PLAN. *Federal Register, 39(102):18298, May 24, 1974.*

Proposed revisions to the Michigan state implementation plan to meet ambient air quality standards are presented. The revision concerns requirements for permits to install and operate equipment in sources of pollution which may prevent attainment or maintenance of a national standard. Comments are solicited.

43052 **APTIC NO. 66155**

Quarles, John

APPROVAL OF PLAN REVISIONS: NORTH CAROLINA. *Federal Register, 39(156):28879-28880, Aug. 12, 1974.*

The Environmental Protection Agency approves a North Carolina implementation plan revision requiring a permit for construction of new facilities or a modification of new facilities of certain types, such as parking lots, residential developments, stadium, drive-in theaters, amusement parks, highways, and airports. The revision establishes conditions for denying a permit to construct an indirect source, enables the state to prevent construction of highways which would interfere with the attainment and maintenance of a national standard, and provides adequately for public comment on projected indirect sources.

43053 **APTIC NO. 66156**

Quarles, John

APPROVAL OF PLAN REVISION FOR STATE OF NEW HAMPSHIRE. *Federal Register, 39(156):28879, Aug. 12, 1974.*

New Hampshire proposed an amendment to the state air pollution control law exempting steam locomotives and engines from the New Hampshire Air Pollution Control Regulations. The Environmental Protection Agency has approved this proposed revision of the state implementation plan. The revision exempts two railways from the regulation controlling visible and particulate emissions from fuel burning equipment, since both railways are tourist attractions operating with seasonal restrictions.

43054 **APTIC NO. 66160**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS. *Federal Register, 39(133):25330-25351, July 10, 1974.*

The procedure for the maintenance of national ambient air quality standards is described whereby the growth of new and modified sources, population, industrial activity, and mobile sources can be analyzed in relation to regional air quality. The designation of Air Quality Maintenance Areas (AQMA) requires that the states should consider, as a minimum, all Standard Metropolitan Statistical Areas (SMSA). Approval is given to state implementation plans making adequate submission of AQMA material, and disapproval of plans is given for states which did not submit, in a procedurally adequate fashion, AQMA designations. For states with disapproved plans, AQMAs are proposed. The means for designating AQMAs, non-SMSA identification, and a summary of proposed state actions are given. Interested persons may participate in the rulemaking by submitting written comments.

43055 **APTIC NO. 66163**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLAN. MICHIGAN- MISCELLANEOUS AMENDMENTS. *Federal Register, 39(152):28285-28286, Aug. 6, 1974.*

The Michigan state implementation plan to achieve Federal ambient air quality standards contained sulfur dioxide emission regulations for power plants, but neglected to supply interim compliance dates. Therefore the regulation was disapproved in that respect, and a Federal compliance schedule was proposed and promulgated after public hearings. A change to the Federal compliance schedule specified that compliance must be with the specified emission limitations of Rule 336.49. Therefore, the compliance schedule regulation was vacated in a court case. In accordance with the court's instructions, the Environmental Protection Agency revoked the vacated regulation. Because of the imminence of the July 1, 1975 final compliance date of Rule 336.49, the EPA will not engage in any further rulemaking with respect to compliance schedules at this time. Accordingly, each power plant in a Priority I or II air quality control region in Michigan continues to be required to comply with applicable emission limitations of the rule no later than July 1, 1975 unless EPA approves a plan revision.

43056 **APTIC NO. 66180**

Quarles, John

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. PENNSYLVANIA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(164):30349-30352, Aug. 22, 1974.*

Revisions of compliance schedules for the State of Pennsylvania Implementation Plan are listed according to source, location, regulation involved, date of adoption, effective date, and final compliance date; the revisions are approved by the Environmental Protection Agency with specific exceptions pursuant to the provisions of 40 CFR 51.8. Ten sources receiving amended compliance schedules subsequent to the date of publication of proposed rulemaking will be reevaluated by EPA, and similarly the EPA will take no action with regard to the compliance schedules of 40 sources proposed for approval whose dates for final compliance will have passed by the date of the present publication. The compliance schedules listed meet the requirements of 40 CFR 51.15.

43057 **APTIC NO. 66183**

Quarles, John

KENTUCKY. APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register, 39(167):30942-30943, Aug. 27, 1974.*

Compliance schedules for the state of Kentucky are proposed. Each proposed schedule establishes a date by which an individual air pollution source must attain compliance with an emission limitation of the State implementation plan. Public comments are invited.

43058 **APTIC NO. 66184**

Quarles, John

ASBESTOS MANUFACTURING POINT SOURCE CATEGORY. EFFLUENT LIMITATIONS AND GUIDELINES FOR CERTAIN SUBCATEGORIES. *Federal Register, 39(169):31592-31599, Aug. 29, 1974.*

Effluent limitations and guidelines for certain subcategories in the asbestos manufacturing point source category are proposed. The regulations will amend 40 CFR Part 427, asbestos manufacturing point source category, by adding the coating or finishing of asbestos textiles subcategory (Subpart H), the solvent recovery subcategory (Subpart I), the vapor absorption subcategory (Subpart J), and the wet dust collection subcategory (Subpart K) pursuant to sections 301, 304 (b) and (c) 306 (b), and 307 (c) of the Federal Water Pollution

Control Act as amended. Both the vapor and dust are removed by wet scrubbers.

43059 **APTIC NO. 66202**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PREVENTION OF SIGNIFICANT AIR QUALITY DETERIORATION. *Federal Register, 39(167):31000-31009, Aug. 27, 1974.*

Proposed regulations for the prevention of significant air quality deterioration are presented. The requirements are necessary to comply with the Clean Air Act and incorporate four basic features. Areas would be designated under three classifications based upon whether changes in air quality would be significant or insignificant. The impact of a proposed new source on the applicable deterioration increment would be assessed through conventional new source review procedures applied to proposed facilities in 19 specific major source categories. The deterioration increments in two classes are a firm ceiling which cannot be exceeded by any new major source, but reclassification procedures are included. The determination of what constitutes significant deterioration is the responsibility of the States subject to approval of the Environmental Protection Agency.

43060 **APTIC NO. 66187**

Ravan, Jack E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. ALABAMA COMPLIANCE SCHEDULES. *Federal Register, 39(177):32759-32763, Sept. 11, 1974.*

Proposed revisions to compliance schedules for the state of Alabama are presented. Each proposed revision establishes a new date by which an individual air pollution source must attain compliance with an emission limitation of the State implementation plan. Public comment is invited.

43061 **APTIC NO. 66178**

Ray, Hurlon C.

IDAHO. AIR QUALITY IMPLEMENTATION PLAN. *Federal Register, 39(165):30496-30497, Aug. 23, 1974.*

Public comment is invited on whether revisions to the State of Idaho Implementation Plan should be approved or disapproved by the Environmental Protection Agency. The plan revisions submitted by Idaho include: five stationary source compliance schedules, Regulation T, Air Pollution Source Permits, indirect source review procedures, amendments to Regulation A to include permit provisions for indirect sources in the rules and regulations of the control of air pollution in Idaho, and modifications to the emergency episode plan included in Chapter XII of the implementation plan.

43062 **APTIC NO. 65970**

Sasaki, S.

FEASIBILITY OF FACTORY RELOCATION. *In: Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Research Inst. for Environmental Protection (Japan), p. 95-109, 1974. 14 refs.*

The feasibility of relocating factories to decrease pollution in highly polluted areas is discussed. Ten metal goods manufacturing factories which represent the average characteristics of the metal goods manufacturing industry in Tokyo are used as a model industry. The effects of various controls such as control standards and land taxes on this model are analyzed statistically. The variations in profit rate caused by various control standards and land taxation are determined and compared to the costs of factory relocation. Control standards and land taxes decreased in effect as the size of the enterprise increased. Because of the large impact of factory relocation expenses, low-interest financing and purchase of former sites at proper prices would be necessary to make relocation economically feasible for small enterprises. Larger enterprises might adopt indirect steps to promote relocation.

43063 **APTIC NO. 62397**

Siehl, George

ENVIRONMENT UPDATE. *Libr. J., 99(10):1357-1363, May 15, 1974. 63 refs.*

The effects of the energy crisis in 1973 on environmental control are reviewed. Congressional action affecting the environment included authorization of the Alaska oil pipeline, authorization of year-round daylight saving time and a maximum nationwide speed limit of 55 mph, legislation to consolidate and expand energy research and development, postponement of 1975 automotive emission standards for one year, legislation to protect endangered species, a strong coal surface mining bill and a land use planning bill, and a three-year extension of the Environmental Education Act. Executive branch actions included diplomatic negotiations with leaders in the Mideast, the President s proposal that the U. S. become self-sufficient in energy resources by 1980, and other environmental proposals. Environmental literature published in 1973 in the fields of energy, parks, forests, the state of the environment, wildlife, oceans, and reference tools are listed.

43064 **APTIC NO. 66113**

Snyder, Daniel J., III

COMMONWEALTH OF PENNSYLVANIA IMPLEMENTATION PLAN. PROPOSED REVISION. *Federal Register, 39(184):33808, Sept. 20, 1974.*

A proposed revision to the Pennsylvania state implementation plan is presented, and public comment is solicited. The revision concerns Philadelphia s approved portion of the implementation plan. The revision amends Regulation X, Complex Source Review; Regulation I, General Provisions; and Regulation XI, Control of Emissions from Incinerators.

43065 **APTIC NO. 66114**

Snyder, Daniel J., III

MARYLAND. PROPOSED COMPLIANCE SCHEDULES. *Federal Register, 39(148):27700, July 31, 1974.*

Comments are solicited on proposed compliance schedule revisions of the Maryland state implementation plan. Each proposed revision establishes a date by which an individual air pollution source must attain compliance with an emission limitation of the implementation plan. The date is listed in a table below the heading of final compliance date.

43066 **APTIC NO. 66108**

Svore, Jerome H.

IOWA. PROPOSED REVISION TO IMPLEMENTATION PLAN. *Federal Register, 39(134):25502-25503, July 11, 1974.*

Proposed revisions to the Iowa state implementation plan are presented, and comments are solicited. The proposed changes affect various emission standards including some for nitrogen oxides and sulfur dioxide.

43067 **APTIC NO. 66109**

Svore, Jerome H.

KANSAS. PROPOSED REVISION TO IMPLEMENTATION PLAN. *Federal Register, 39(134):25503, July 11, 1974.*

A proposed revision to the Kansas state implementation plan is presented, and comments are solicited. The revision consists of the following changes: state regulatory control of small-sized incinerators is now included in the regulations; the compliance schedule is amended; all open burning operations other than those exempted must cease operation immediately; a regulation is added which requires that new or altered pollution sources be reviewed and approved prior to construction; and changes are made in the sulfur dioxide and nitrogen oxide emission standards.

43068 **APTIC NO. 66154**

Svore, Jerome H.

MISSOURI. APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(185):34066-34070, Sept. [illegible] 974.*

Approved and disapproved [illegible] compliance schedules for the Missouri state implement[illegible] plan to meet national ambient air quality standards are presented. The sources are listed with their location, the regulation involved, the date adopted, variance expiration date, and final compliance date. Comments on the schedules are solicited.

43069 **APTIC NO. 62570**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. FINAL RECLASSIFICATION OF AIR QUALITY CONTROL REGIONS. *Federal Register, 39(90):16344-16348, May 8, 1974.*

The Environmental Protection Agency has reclassified the priority level for nitrogen oxides control of a number of Air Quality Control Regions. Where States have adopted, and EPA has approved, regulations calling for control of nitrogen oxides emissions from stationary sources in AQCR s which would be reclassified from priority I to priority III, EPA will entertain State requests for implementation plan revisions that would rescind such regulations. Sixteen separate comments were received on the proposed reclassification of regions for nitrogen dioxide. In consideration of these and other comments, the proposed reclassification has been modified.

43070 **APTIC NO. 66149**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. REVISIONS TO UTAH PLAN. *Federal Register, 39(173):32113-32116, Sept. 5, 1974.*

Revisions to the Utah state implementation plan are described. The revisions apply to proposed regulations limiting emissions for particulate matter from process sources, fuel combustion, incineration, and coke ovens in the Wasatch Front Intrastate Region. The results of hearings on the revisions, new emission limits and other regulations, changes in complaince schedules, and revised dates for attainment of national standards are described.

43071 **APTIC NO. 66150**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. ARIZONA TRANSPORTATION CONTROL PLAN; REVISIONS AND CORRECTIONS. *Federal Register, 39(173):32111A-32113, Sept. 5, 1974.*

Revisions and corrections of the Arizona transportation control plan of the state implementation plan to meet ambient air quality standards for carbon monoxide are presented and approved. The control plan revisions are concerned with the employer carpool incentive program and the bus/carpool matching program. A 60-day extension is granted for compliance dates for these programs which affect employers maintaining at least 200 parking spaces.

43072 **APTIC NO. 66179**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. SOUTH CAROLINA; NEW EMISSION LIMITS. *Federal Register, 39(174): 32329-32330, Sept. 6, 1974.*

New sulfur dioxide emission limits for the South Carolina Implementation Plan are approved by the administrator of the Environmental Protection Agency. The effect of the revision is to replace the existing SO2 emission limits for fuel combustion sources with less stringent limits to be applied on the basis of a county classification system. The classifications are subject to review and change at intervals not to exceed three years. The approval action is effective October 7, 1974.

43073 **APTIC NO. 66181**

Train, Russell E.

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. WEST VIRGINIA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(175):32559-32560, Sept. 9, 1974.*

Revised compliance schedules for the West Virginia Implementation Plan are listed in terms of source, location, regulation involved, date of adoption, effective date, and final compliance date. The revisions are approved by the Environmental Protection Agency with specific exceptions pursuant to the provisions of 40 CFR 51.8. The EPA will take no action with regard to the compliance schedules of three sources proposed for approval whose dates for final compliance will have passed by the date of the present publication.

43074 **APTIC NO. 66182**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. COMPLIANCE SCHEDULES FOR NORTH CAROLINA. *Federal Register, 39(175): 32563-32566, Sept. 9, 1974.*

Compliance schedules for the North Carolina Implementation Plan are listed in terms of source, location, permit number regulation involved, date of adoption, effective date, and final compliance date. The schedules are additions to the table published in the Federal Register of June 20, 1973, as satisfying the compliance schedule requirements for state implementation plans. Interested parties are encouraged to submit written comments on the proposed schedules prior to Environmental Protection Agency approval or disapproval.

43075 **APTIC NO. 66185**

Train, Russell E.

REQUIREMENTS FOR THE PREPARATION, ADOPTION AND SUBMITTAL OF IMPLEMENTATION PLANS. EMISSION MONITORING OF STATIONARY SOURCES. *Federal Register, 39(177):32871-32874, Sept. 11, 1974.*

Requirements for the preparation, adoption, and submittal of implementation plans on the emission monitoring of stationary sources are proposed. General specification for accuracy, reliability, and durability are proposed for continuous emission monitors of oxygen, sulfur dioxide, and nitrogen dioxide, and for the continuous measurement of opacity for particulate matter emissions. State plans must require owners or operators of specified categories of stationary sources to install emission monitoring equipment within 1 yr of plan approval; specify the categories of sources subject to the requirements; identify for each category of sources the pollutants which must be monitored; provide performance specifications for monitoring instruments; require that instruments meet performance specifications; and require that data derived from the monitoring be summarized and made available to the State on a quarterly basis.

43076 **APTIC NO. 66243**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. APPROVAL AND DISAPPROVAL OF PLAN REVISIONS FOR MICHIGAN AND WISCONSIN. *Federal Register, 39(176):32606-32607, Sept. 10, 1974.*

The approval and disapproval of implementation plan revisions in compliance schedules for Michigan and Wisconsin are announced. Several schedules were disapproved because of failure to comply with substantive requirements relating to compliance schedules in 40 CFR 51.15. Many schedules are unenforceable by the State and others do not contain sufficient number of increments of progress to permit close supervision for timely compliance or have final compliance dates which extend beyond the state implementation plan attainment dates. The air pollution sources on disapproved schedules remain subject either to Federally promulgated compliance schedules or to the immediate or future effective compliance dates as applicable in the Federally approved State implementation plans.

43077 **APTIC NO. 63333**

Williams, J. R., C. G. Justus, and Robert H. Collom

THE GEORGIA TALL STACK STANDARD AND THE ENERGY CRISIS. *J. Air Pollution Control Assoc., 24(5):479-483, May 1974. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Miami Beach, Fla., June 1972.)*

The control strategy for sulfur dioxide and particulates for the Georgia Implementation Plan was developed during 1971 from a detailed analysis using diffusion modeling of present and projected air quality for SO2 and particulates in the Atlanta and Savannah air quality control regions. The results of the diffusion model correlated well with air quality measurements made at 26 sites in these two regions. A variety of control strategies aimed at achieving the standards with minimal disruption to industry and the private sector were tested. Particulate emissions were restricted for industrial processes according to the process input weight rate and for fuel burning sources according to the rated boiler capacity. An additional restriction based on stack height was required for SO2 emissions since the practicality of obtaining adequate supplies of low sulfur fuel or installing SO2 removal equipment appeared uncertain at that time. Diffusion modeling showed that the enforcement of these emission standards would result in both the federal and state ambient standards for SO2 and particulates being achieved by 1975. The unique feature of the Georgia emission regulations is the allowance of very tall stacks for SO2 control. This had an important beneficial impact on the state's energy supplies during the 1973-1974 energy crisis. (Author abstract modified)

43078 **APTIC NO. 62516**

Yoshitani, N.

EMERGENCY MEASURE FOR OXIDANTS CONTROL IN KANAGAWA PREFECTURE. *(Kanagawa-ken ni okeru okishidanto no kinkyuji taisaku). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(3):44-52, March 1974.*

The measurement of oxidants started in 1971 in this prefecture. Emergency regulation for air pollution control in this prefecture was improved to include the regulation of hydrocarbon. One hundred and nine factories were chosen as controlled factories which emit a large amount of NOx. These factories use 95% of the fuel used in this prefecture. The warning against the photochemical smog has three classes, notice, warning, and emergency warning. The use of fuel in these factories should be reduced 20, 25, and 40% in these cases, respectively. The work in factories which emit NOx without burning fuel should stop when the emergency warning is called. Control of automobile traffic should be implemented depending on the grade of warning. The system of monitoring stations was centralized by telemetry in 1972 and 1973. Information about photochemical smog is transmitted by telephone.

43079 **APTIC NO. 66297**

California State Air Resources Board

SUMMARY OF ASSEMBLY-LINE PLANT INSPECTIONS. *Rept. 74-13-5, 14p., July 10, 1974.*

Assembly line plant inspections were made to observe emission related activities of vehicle manufacturers and to collect quality control information for determining compliance with the assembly line test procedures. Technical inspections conducted since Oct. 1973 in the United States, Western Europe, Japan, and Canada are summarized. Manufacturers were following the spirit of the assembly line test procedures. Sample selection needs to be improved to achieve statistically random samples. Major manufacturers find that the inspection tests are cost/effective quality control tools. Some manufacturers are conducting functional tests and idle emission tests on vehicles manufactured for sale in the other 49 states.

43080 **APTIC NO. 66320**

Committee for Economic Development, New York

MORE EFFECTIVE PROGRAMS FOR A CLEANER ENVIRONMENT. *92p., April 1974. 10 refs.*

The sources and control of the major air pollutants are summarized. In the United States about 1 ton of wastes per person is discharged into the atmosphere in a year. The major pollutants are carbon monoxide, sulfur oxides, particulates, hydrocarbons, and nitrogen oxides. Carbon monoxide is half (100.2 million tons/yr) of the total pollutants (208.4 million tons/yr). Most CO is discharged from automobiles (77.5 million tons which are also the major source of hydrocarbons (14.7 million tons). The total emissions of SOx are second (32.6 million tons) with stationary fuel combustion as the major source (26.3 million tons). Industrial sources account for half (13.6 million tons) of the total particulate emissions (27.0 million tons). Nitrogen oxides total 22.0 million tons/yr and are primarily from transportation (11.2 million tons) and stationary fuel combustion (10.2 million tons). Federal regulation of air pollution began with the Clean Air Act of 1963 and was strengthened by subsequent legislation. Costs of pollution control escalate rapidly as the requirement for abatement approaches 100%. The most important reform needed in the air pollution control program is for greater flexibility because of the wide regional variations in quality of ambient air. Various methods to control pollution are discussed, including solid waste disposal, effluent fees, automobile emission control programs, and control agencies.

43081 **APTIC NO. 66359**

Office of Air and Waste Management, Research Triangle Park, N. C., Strategies and Air Standards Div.

INSPECTION AND MAINTENANCE OF LIGHT-DUTY, GASOLINE-POWERED MOTOR VEHICLES: A GUIDE FOR IMPLEMENTATION FINAL REPORT. *Rept. EPA-450/2-74-005, 90p., Aug. 1974. 20 refs.*

A guide for implementing and monitoring an emissions inspection and maintenance program for motor vehicles is presented for use by federal, state, and local agencies concerned with such responsibilities. Topics covered include: major inspection and maintenance methods, legal considerations, implementation factors, monitoring and reporting requirements, and federal and state programs in the field. Tables of information are provided for: National Air Quality Standards for motor-vehicle-related pollutants, engine parameter inspection, New Jersey-approved manufacturers of low cost infrared analyzers suitable for use in repair garages, initial reduction in pollutants using major inspection strategies, reductions in atmospheric emissions from vehicles subjected to emission inspection, New Jersey idle inspection standards, costs of equipment for emission inspection, inspection station cost estimates, total program costs for the state of California, and inspection and maintenance emission data. (Author abstract modified)

43082 **APTIC NO. 66546**

Research Triangle Inst., Research Triangle Park, N. C., Environmental Studies Center

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS, VOLUME 2, PLAN PREPARATION (FINAL REPORT). *Environmental Pro-*

tection Agency Contract 68-02-1386, Task 1, Rept. EPA-450/4-74e 002, QAQPS 1.2-021, 158p., July 1974. 68 refs.

Procedures and analytical methods are described for developing an Air Quality Maintenance Plan (AQMP) for those areas that has the potential of exceeding the National Ambient Air Quality Standards (NAAQS) because of present air quality or projected growth from 1975-1985. Procedures are described for projecting air quality through 1985, estimating associated air quality, and identifying and quantifying any potential air quality maintenance problem. Using this analysis as a base, procedures for developing alternative maintenance strategies and selecting a feasible strategy for the AQMA are presented. Methods of evaluating the social and economic impact of maintenance strategies are included. Content and format of an acceptable AQMP are included along with suggested intergovernmental cooperation arrangements and a suggested time schedule for development and submission of the AQMP by June 18, 1975 as required in 40 CFR 51. (Author abstract modified)

43083 **APTIC NO. 66569**

Voorhees (Alan M.) and Assoc., Inc., McLean, Va.

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS VOLUME 4: LAND USE AND TRANSFORMATION CONSIDERATIONS (FINAL REPORT). *Environmental Protection Agency Contract 68-02-1388, Rept. AP-450/4-74-004, QAQPS 1.2-023, 126p., Aug. 1974. 57 refs.*

Methods and practice in land use and transportation planning are described and the development and uses of comprehensive plans and 3-C plans are discussed. General approaches are offered for considering air quality maintenance in the comprehensive planning process and for evaluating impacts of land use and air quality maintenance in the comprehensive planning process and for evaluating impacts of land use and air quality plans and policies. Information, organization, and analytical techniques necessary for relating land use and transportation to air quality are discussed. The state of the art for quantifying the relationship of land use and transportation plans to air quality is reviewed. Land use is related to transportation. An annotated bibliography of activity allocation procedures is included. (Author abstract modified)

1973

43084 **APTIC NO. 65971**

Ireland, F. E.

CONTROL OF AIR POLLUTION IN THE BRITISH IRON AND STEEL INDUSTRY. *New York State Univ., Buffalo, Steel Ind. Environ., Proc. C. C. Furnas Mem. Conf., 2nd, Buffalo, N. Y., 1971, p. 9-25, 1973.*

In Britain, control of emissions to air is divided between local and central authorities. Control begins with land use by means of the Planning Acts. In the case of the central government, control is through the Alkali and Works Regulations Act of 1906. The application of this Act in England and Wales with regard to the iron and steel industry is reviewed. Regulations in the ore preparation, blast furnace, crude steel, foundry, and ferroalloy processes are reviewed. The economics of pollution control, the composition of metallurgical furnace emissions, the staff and organization of the Alkali Inspectorate are also mentioned.

43085 **APTIC NO. 66472**

Selig, Edward I.

NATIONAL CHARGES ON EMISSIONS OF SULFUR OXIDES: THE MOSS PROPOSAL. *In: Effluent Charges on Air and Water Pollution: A Conference Report. Oct. 15 and 16, 1971, Washington, D. C. Summary of Proceedings with Reporter s Notes. p. 52-61, 1973. 2 refs.*

A national sulfur tax proposal is described. The proposal requires that 20 cents/lb should be assessed on all sulfur emitted into the environment by 1975, with an initial rate 5 cents in 1972 increased each year. The charge should be applied uniformly throughout the nation. Congress should set the level of the charge. The revenue should not be earmarked, since no program s funding ought to depend on revenues resulting from lack of pollution control. No subsidies should be given to industries for pollution control, but workers laid off because of plant closures should receive assistance in the form of retraining, relocation, and unemployment compensation. The reasons for this proposal and its effects are discussed.

43086 **APTIC NO. 56559**

Kyoto Prefectural Government (Japan), Public Health Div.

AIR POLLUTION BY PHOTOCHEMICAL REACTIONS AND THE MEASURES AGAINST IT. *(Kokagaku hanno ni yoru taiki osen to somo taisaku). Text in Japanese. 16p., July 1973.*

Photochemical reactions in Kyoto Prefecture and control measures are discussed. Automobiles exhaust 40% of the nitrogen oxides and 80% of the hydrocarbons; industries exhaust the remaining pollutants. Nine smog notices and one warning were given in summer 1972. Oxidant concentrations were maximum at 1 or 2 pm. Sixty-two people had eye and throat irritation from July to Oct. 1972. Kyoto city has 11 control stations which monitor sulfur oxides, aerosols, oxidants, NOx, and HC. Other areas in the Prefecture have 16 stations and two mobile stations. Notices, warnings, and alerts of smog are given when oxidant concentrations are over 0.15, 0.30, and 0.50 ppm, respectively. Factories exhausting 8000 N cu m/hr stack gase or using 2000 l/day organic solvents must reduce exhaust gas or solvent by 20-40% when notices or warnings are given.

43087 **APTIC NO. 62281**

Energy Policy Office

PROPOSED ESTABLISHMENT OF PRIORITIES OF USE AND ALLOCATIONS OF SUPPLY FOR CERTAIN LOW SULFUR PETROLEUM PRODUCTS (FINAL ENVIRONMENTAL IMPACT STATEMENT). *84p., Nov. 1973. 20 refs.*

NTIS: EIS-AA-73-1766-F

The final environmental impact statement is presented on the proposed establishment of priorities of use and allocations of supply for certain low sulfur petroleum products. The proposed action would temporarily prohibit utilities and other large fuel users from switching from coal or residual fuel oil to lower sulfur petroleum fuels and prohibit increases in the quantity of distillates blended into residual oils, except where such actions are absolutely necessary to meet primary ambient air quality standards. The short duration and relatively small quantities of coal and oil affected by the proposal will cause only very limited environmental impacts. The main impact would be on air quality. However, the proposed action would not adversely affect existing air quality, but would defer altogether for less than a year the improvement of air quality standards in the areas affected. Minor land use and water quality impacts would also occur. Alternatives considered were no action, increased domestic petroleum production, increased use of natural gas, energy conservation, forced conversion to coal, a Mandatory Fuel Allocation Program, and long term proposals to increase supply. (Author summary modified)

43088 **APTIC NO. 66311**

International Business Machines Corp., Gaithersburg, Md., Federal Systems Div.

TECHNICAL SERVICES FOR NATIONWIDE EMISSION INVENTORY OF POINT SOURCES FOR THE STATE OF NEW JERSEY (FINAL REPORT). *Environmental*

Protection Agency Basic Order Agreement 68-02-0043, Task Order 11, Rept. APTD-1561, 11p., 1973 (?).

The preparation and compilation of National Emissions Data System coding forms for state of New Jersey facilities with estimated emissions of any pollutant over 100 tons/year or identified by Appendix C of the Federal Register (August 14, 1971) are described in terms of the task approach, ground rules used in conjunction with Chapter 4 of the NEDS Manual, meetings with state personnel, and results achieved. The NEDS forms were completed for a total of 337 facilities, 205 of which were non-federal facilities, meeting the NEDS criteria and for which 1970 inventory questionnaires were available. Total number of NEDS forms process was 1877. The final number of NEDS forms submitted for inclusion into the NEDS system was reduced to 1485 after review.

43089 **APTIC NO. 66462**

Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center

ANNUAL REPORT 1972. *84p., 1973.*

GPO

The first annual report of the Environmental Protection Agency is presented both as a working document and as an introduction to the Agency's programs, goals, and accomplishments. Topics of the report include: an introduction to the purpose, mission, history, and organization of EPA, as well as a funding summary; special features on the Community Health and Environmental Surveillance System, the control of sulfur oxides in flue gas, and the Regional Air Pollution Study; and laboratory reports from the Office of the Director, the Human Studies Laboratory, the Experimental Biology Laboratory, the Primate and Pesticides Effects Laboratory, the Chemistry and Physics Laboratory, the Control Systems Laboratory, the Meteorology Laboratory, the Quality Assurance and Environmental Monitoring Laboratory, and the Eastern Environmental Radiation Laboratory.

43090 **APTIC NO. 66464**

California Air Resources Board

THE STATE OF CALIFORNIA IMPLEMENTATION PLAN FOR ACHIEVING AND MAINTAINING THE NATIONAL AMBIENT AIR QUALITY STANDARDS. REVISION 4. *56p., Dec. 31, 1973.*

A revision to the California Implementation Plan for Achieving and Maintaining the National Ambient Air Quality Standards is presented which includes: changes to the State General Plan made since the submittal of Revision 3 that reflect changes to state law and programs, including the State's Air Pollution Emergency Contingency Plan and state and local agencies resources; a revised emission control strategy for the South Coast Air Basin; and amendments to local districts rules and regulations since the submittal of Revision 3. Revised control strategies for the South Coast Air Basin concern: the use of organic solvents, motor vehicle and aircraft emissions, mass transportation, and improved traffic flow.

1972

43091 **APTIC NO. 66531**

Adler, Vivian O.

THE VIABILITY OF CLASS ACTIONS IN ENVIRONMENTAL LITIGATION. *Ecol. Law Q., 2(3):533-570, Summer 1972. 223 refs.*

The usefulness of class actions under rule 23 of the Federal Rules of Civil Procedure is considered in relation to accomplishing environmental litigation. Recent environmental class actions are examined to indicate pitfalls that environmental attorneys must avoid in order to maintain class suits successfully. Class actions are recommended for all public lawsuits because of their greater benefits to the public as opposed to traditional standing tests and because such actions aid the defendant since a single inclusive judgment shields him from the harassments of multiple litigation. A more cautious attitude toward the class action format is recommended for private cases, with the procedure being confined for damages where a clearly definable class exists.

43092 **APTIC NO. 65964**

Colliard, C. A.

AIR POLLUTION CONTROL. STUDY IN COMPARATIVE LAW. *In: Legal Aspects of Air Pollution Control. Council of Europe, Committee of Experts on Air Pollution, EXP/Air(72):11, p. 2-13, Oct. 1972.*

Legal aspects of air pollution in 12 countries are compared. The problems of legal technology, the techniques by which the general legislative system are implemented, and the possible forms of action are generally discussed. Pieces of national legislation which are typical are used as examples to back up main points.

43093 **APTIC NO. 66566**

Cramton, Roger C. and Barry B. Boyer

CITIZEN SUITS IN THE ENVIRONMENTAL FIELD: PERIL OR PROMISE? *Ecol. Law Q., 2(3):407-429, Summer 1972. 109 refs.*

The role of private citizen litigation in enforcing environmental legislation is discussed. Extensive changes are being made in the area of citizen suits directly against alleged polluters. The Clean Air Amendments of 1970, the Federal Water Pollution Control Acts Amendments of 1972, and the Noise Control Act of 1972 all provide that citizens can bring actions directly against violators of federal standards. The practical efficacy of these provisions are not determined. There may be difficulties in coordinating citizen suits with Government enforcement programs, but this approach may solve the problems of inadequate enforcement resources. The Supreme Court's declaration in Illinois vs. City of Milwaukee gave a federal common law right to abate interstate pollution. This common law action, which is designed to operate in the interstices of existing environmental statutes and be guided by their principles, should prove a valuable supplement to existing enforcement programs. The concept of an implied right of private action under anti-pollution statutes such as the Rivers and Harbors Act of 1899 seems capable of further development at the instance of enterprising litigants. (Author conclusions modified)

43094 **APTIC NO. 65965**

Kiss, A. C.

EFFORTS TO CONTROL AIR POLLUTION AT INTERNATIONAL LEVEL. *In: Legal Aspects of Air Pollution Control. Council of Europe, Committee of Experts on Air Pollution, EXP/Air(72)11, p. 14-67, Oct. 1972. 86 refs.*

The present stage of international cooperation in air pollution control, possible programs of action, international regulations, supervision and monitoring of pollution on an international level, and education and information aspects are reviewed. There have been several international studies on pollution, such as NATO and European Coal and Steel Community research. The activities of these various international organizations in controlling pollution are reviewed. The means of combating pollution covered include development of nonpolluting industrial processes, control or gradual elimination of certain agricultural practices, development of nonpolluting engines, elimination or improvement of polluting fuels, elimination of pollutants before emission, and dispersal of pollution sources. The economic effects of pollution and of pollution control, the exchange of information and knowledge, harmonization of national laws, and training of pollution experts are also discussed.

43095 **APTIC NO. 66532**

Manaster, Kenneth A.

PERSPECTIVE. EARLY THOUGHTS ON PROSECUTING POLLUTERS. *Ecol. Law Q., 2(3):471-492, Summer 1972. 55 refs.*

Prosecution of polluters is discussed in relation to substantive policy choices that should be promoted by environmental prosecution, resources necessary to pursue desired policies, and procedural routes and problems. Topics reviewed include: the practical determination of which polluters and which pollution should be focused upon, the selection of categories of polluters, existing pollution problems versus prospective or anticipatory lawsuits, litigation versus conciliation, mandatory injunctive relief, hardship issues, penalty magnitudes, legal staff requirements, technical consultation on industrial processes, the collection of evidence in litigation, and the problem of fluctuating standards.

43096 **APTIC NO. 66518**

Wortreich, Herbert

REGULATION OF SOLVENT EMISSIONS TO THE ATMOSPHERE. *AIChE Symp. Ser., 68(126):289-290, 1972. 15 refs.*

Regulations for the control of air pollution in New Jersey are discussed. Although New Jersy has had an air pollution control law since 1954, the state has no authority until 1961 to correct problems caused by sources other than certain types of combustion. Chapter 6 of the air pollution code enabled the state to initiate enforcement actions against a wide range of problems involving dusts, fumes, odors, and irritants. Since 1965 a new code went into effect regulating emissions of solid particles from point sources and incinerator performance. About 99% of all the cases dealt with under Chapter 6 involve odorous or irritating air contaminants with solvent vapors representing about 75% of these. In 1976 preventive powers were added to the corrective authority. In the absence of emission standards, cause and effect relationships must be established before formal enforcement action may be taken. Requirements of current federal legislation may result in new state regulations which deviate from traditional enforcement concepts. (Author abstract modified)

1971

43097 **APTIC NO. 66499**

Plock, Gene

ENVIRONMENTAL PLANNING. *Louisville, Ky., Speed Scientific School and American Society of Civil Engineers, Kentucy Section, Environ. Eng. Sci. Conf., Proc. Annu. Meet., 1st, Louisville, Ky., 1971, p. 107-116. (March 19.)*

Many discussions of environmental planning involve unproven emotionally motivated opinions, inaccuracies, and calls for regulations beyond the capabilities of technology which ignore more pressing and solvable problems of greater magnitude. Several examples of this are described. A proposal is given for organizing environmental planning which would eliminate cheating, determine control technology, standardize monitoring, develop cost information, assess environmental effects, and keep information updated.

43098 **APTIC NO. 34705**

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

GUIDE FOR AIR POLLUTION EPISODE AVOIDANCE. *Pub-AP-76, 139p., June 1971. 85 refs.*

NTIS: PB 201456

This guide is intended to assist air pollution control officials and local governmental authorities in the formulation and implementation of emergency action plans for the avoidance of air pollution episodes. The planning, technical, social, economic, legal, and administrative factors of importance in episode avoidance are included. The effects of particulate matter, irritants, oxidants, and system poisons are indicated. Emission inventories are cited. Aerometric monitoring is discussed, as well as the display of information. Regional factors affecting episodes are included. Emergency control procedures are outlined. Costs related to air resource management are mentioned, and public education on air pollution is discussed. Basic concepts of an Emergency Action Center are presented.

43099 **APTIC NO. 66481**

California Air Resources Board

THE CALIFORNIA STRATEGY FOR ACHIEVING AND MAINTAINING THE NATIONAL AMBIENT AIR QUALITY STANDARDS, SUMMARY. *10p., Feb. 1972.*

The California strategy for achieving and maintaining the national ambient air quality standards is summarized. The plan proposes a number of measures for air pollution control applicable statewide, and that several additional, more stringent measures be applicable in the State s populous air basins. The implementation of these measures is expected to improve air quality throughout the State. Under the State s present control program, emissions from motor vehicles in 1975 will be less than in 1970. Emissions of reactive organic gases, carbon monoxide, and oxides of nitrogen will be reduced by 60%, 50%, and 40% respectively. State and local governments cooperate to control air pollution. The State is responsible for the control of emissions from motor vehicles, while local air pollution control districts have the primary authority for the control of emissions from stationary sources. The State also oversees and coordinates the efforts of various agencies concerned with the control of air pollution in California. The control strategies provided in the plan are outlined. (Author summary modified)

GENERAL

1974

43100 **APTIC NO. 66427**

Bakacs, T.

MAN AND HIS SELF-INFLICTED ARTIFICIAL ENVIRONMENT - DESTRUCTION OF THE ECOLOGIC BALANCE IN CITIES. *(Der Mensch und seine selbstgeschaffene, artefizielle Umgebung. Das zerstoerte oekologische Gleichgewicht in Staedten). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 36(9):668-683, 1974. 18 refs.*

After a review of man s development from his early beginning to today s urban settlers the negative consequences of urbanization (such as environmental pollution) are discussed. Air pollution in cities has reached a high level which leads in increasingly more countries to the introduction of tolerance limits. A table lists the tolerance limits for air pollutants valid in Hungary, the Soviet Union, the U. S., and the Federal Republic of Germany. For example, Hungary has limited the dust fall to 15 mg/m 30 days; the Federal Republic of Germany to 19.50 mg/m 30 days. Noise and water pollution problems are also discussed.

43101 **APTIC NO. 66111**

Thakur, Pramod C.

MASS DISTRIBUTION OF RESPIRABLE DUST PARTICLES FROM US COALS. *Colliery Guardian (London), 222(7):236-239, July 1974. 11 refs.*

Mass distributions of respirable dust from 18 different coal samples were studied. Anthracite and the high volatile bituminous coal constituted the two extremes of distribution, the former being much finer. Consequently, the mass of dust permanently deposited in the lungs per unit time, which determines the degree of hazard, is higher for anthracite than for high volatile bituminous coal. In general, the lower the volatile matter content, the greater the potential hazard to health. The Federal Coal Mines Health and Safety Act of 1969 has imposed a dust standard which applies uniformly to every coal mine in the U. S. In view of the findings of this study, this does not appear to be very realistic. (Author summary modified)

43102 **APTIC NO. 64432**

Ibaraki Prefectural Government (Japan)

THE KASHIMA AREA DEVELOPMENT PROGRESS REFERENCE DATA. *(Kashima chiiki kaihatsu keika sanko shiryo). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 29:79-86, March 1974.*

The history of the development of the Kashima Industrial area is briefly reviewed and the environmental data collected before the initiation of the development plan are presented. Meteorological factors have been observed since 1964. Some of the characteristics are: strong up current in the inland area and strong down current over the waters of two major rivers; irregular and small sea and land breezes; winds predominently northwest to west in winter, south-southwest in summer, and northeast to east in fall and spring. The upper atmosphere is often stable to neutral. The air quality has been monitored since 1965. The maximum ground concentration standard is now set at 0.192 ppm. In this area, a total of 131 stacks including those of the power, steel and iron, petroleum refining, and petroleum chemical industries emit a total of 33,336,372 N cu m/hr emission gases, of which 19,792 N cu m/hr is sulfur dioxide. The average SO2 concentration in emission gas is 592 ppm. The effective stack height was investigated in 1972 by laser-radar. The effective stack height was inversely proportional to the wind velocity, and when the wind velocity was low, the stack height was lower than the theoretical height. On-site dispersion experiments in August 1972 showed that the modified Turner model and the two-layer model were suitable for the Kashima area.

43103 **APTIC NO. 65756**

Coordinating Research Council, Inc., New York, Air Pollution Research Advisory Committee

CRC APRAC STATUS REPORT. *150p., Jan. 1974.*

A status report is presented for engineering, atmospheric, medical projects, and in-house programs relating to air pollution research performed for or by the Coordinating Research Council. Engineering projects include: polynuclear aromatic hydrocarbon emissions from motor vehicles, vehicle fueling emissions, determination of oxygenates in auto exhaust, automobile particulate emissions studies, nitric oxide formation in diesel engines, truck driving pattern and use survey, mass emissions measurement for vehicle exhaust, trip start vehicle operating characteristics, polynuclear aromatic emissions from diesel and turbine engines, and vehicle refueling test development. Atmospheric projects include: factors affecting reactions in environmental chambers, light hydrocarbons in the atmosphere, haze formation, determination of the formation mechanism and composition of photochemical aerosols, fate of nitrogen oxides, reactivity of diesel exhaust, natural hydrocarbon emissions, and atmospheric measurement of photochemical pollutants. Medical projects include: effects of carbon monoxide on human behavior, effects of chronic exposure to CO on the cardiovascular system, toxicity of polynuclear aromatic hydrocarbons in the lung, determination of carboxyhemoglobin in various segments of the population, effects of low levels of CO on humans performing driving tasks, effects of low levels of NOx and oxidants on humans, influence of CO levels upon the incidence of motor vehicle accidents, effects of CO on myocardial infarction fatality rates, eye irritation and lachrymation, fuel additive cardiovascular system of men with ischemic heart disease. In-house programs include: composition of diesel exhaust, exhaust gas sampling and analysis techniques, and reference emission profile.

1972

43104 **APTIC NO. 66357**

Gomes, Damaso Jose da Silva

ATMOSPHERIC POLLUTION. *(Poluica atmosferica). Text in Portuguese. Rev. Port. Farma., 22(3):240-286, 1972. 90 refs.*

A general survey on the causes of pollution, with atmospheric pollution in particular is presented. Most examples are drawn from incidents in the Los Angeles, Meuse Valley, and London areas. The characteristics and toxic effects of the principal atmospheric pollutants are discussed. A distinction is made between the oxide smog prevalent in Los Angeles and the acidic smog in the London area. Control strategies are suggested.

SUBJECT INDEX

A

ABATEMENT
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